

Thrips (Thysanoptera) from Pakistan to the Pacific: a review

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SYNOPSIS. Each of the 91 *Thrips* species (Thysanoptera: Thripidae) known to occur in the Oriental and Pacific Regions is assigned to one of five defined species groups and included in a checklist and identification key. Diagnoses and biological notes are given for all species not restricted to the Indian subcontinent, including seven species new to science. Two new specific synonymies are established in the genus. Twelve Oriental and Pacific species names formerly included in the genus *Thrips* are listed including one new synonymy, three new combinations, one unplaced and one removed to Coleoptera. Four nominal species from the region that have not been examined are listed, including one *nomen dubium*.

INTRODUCTION

The genus *Thrips* probably comprises as many as 250 species and is the largest of all Terebrantian genera. The only other Thysanopteran genus

comparable in size is the phlaeothripid *Haplothrips*. Species of *Thrips* can be found throughout the world in flowers and on leaves of a wide variety of plant hosts from grasses to hardwoods. Some are beneficial pollinators, while others cause significant economic damage. Some are

very common, polyphagous and widespread, while others are rarely seen and restricted to a single locality or one species of plant. Because of this diversity of life-styles there have been as many as 400 or 500 species names associated with the genus and experience has shown that a high percentage of them are synonyms.

The genus was thought to be most diverse in the temperate regions of the world and the study of about 100 nominal species from the Oriental and Pacific Regions was expected to reveal a number of new synonymies. However, only two new synonymies were discovered and 91 species are recognised from the regions. Variation between closely related populations from different Pacific islands is difficult to interpret and these 'island populations' may represent yet more distinct species.

BIOLOGY AND ECONOMIC IMPORTANCE

Species of *Thrips* range from 0.5 to 2.5 mm in length and are most usually found in flowers. Adult thrips are attracted to flowers by both scent and colour and, like the larvae, will feed both on cell sap and pollen. Adults do not necessarily feed only on their breeding host plant (Kirk, 1984a & c, 1985), which can be ascertained only by the presence of larvae. The presence of adults in flowers can be beneficial. *T. hawaiiensis* for example, is probably an effective pollinator for both oil and banana palms in the Pacific Region and *T. imaginis* and *obscuratus* could perform the same function in the orchards of Australia and New Zealand (Kirk, 1984b). However, when thrips occur in the flowers of a host plant on which they breed, populations can build to pest proportions. Then pollen-feeding may reduce pollination, cell-sap-feeding can deform and scar buds, petals, fruit and seeds and any resulting sticky exudations can attract unsightly moulds. Gladiolus flowers worldwide suffer particularly from feeding damage by *T. simplex*.

There are a number of leaf-feeding species of *Thrips* that tend to be attracted to seedlings and young leaves at the growing tips of mature plants. Even trees are not immune from attack and may be defoliated by heavy infestations. *T. calcaratus* causes such damage to *Tilia* species in Europe and North America. Most economically significant damage caused by leaf-feeding species is due to coincidental transmission of isolates of

tomato spotted wilt virus (TSWV) which is carried by *palmi* to groundnuts in India and watermelons in Japan; by *setosus* to tomatoes in Japan; by *tabaci* to tobacco in central Europe (Zawirska, 1976; 1983).

It should be remembered that some species can be extremely common on a particular plant without apparently causing any severe damage. Two such species are *australis* on *Eucalyptus* and *Acacia* and the polyphagous *coloratus*.

LITERATURE

There are numerous small papers on the Australasian and Pacific species of *Thrips*, many by the late Dr K. Sakimura. An account of the Philippines' fauna of about 20 species has been produced by C.P. Reyes (in press). Bhatti (1980) published an invaluable account of 33 species recorded from the Indian sub-continent. The *Thrips* fauna of the New World, comprising about 61 species, has been covered by Gentile & Bailey (1968) and Nakahara (in press) and the 60 or so European species are keyed in Priesner (1964), Mound *et al.* (1976) and Schliephake & Klimt (1979). The fauna of the African continent has not yet been studied in depth but is currently known to be represented by about 30 species of which seven or eight are widespread in other continents as well.

The present work is intended to provide not only a means of identification of the 91 species of *Thrips* from the Oriental and Pacific Regions but also to consider this fauna in a world context. The species included are all those listed by Jacot-Guillarmod (1975) under *Taeniothrips* and *Thrips* from the Oriental and Pacific Regions but excluding those species transferred by Bhatti (1978) to *Amomothrips*, *Ceratothrips*, *Dorcadotrips*, *Javathrips*, *Laplothrips* or *Taeniothrips*. Those species known only from the Indian sub-continent and included in Bhatti (1980) are included in the key but are not discussed fully in the text. The synonymies of each species are not intended to be complete and include only those names associated with the study area.

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BMNH	—The Natural History Museum, London.
BPBM	—Bernice P. Bishop Museum, Hawaii.
CAS	—California Academy of Sciences, San Francisco.
IARI	—Indian Agricultural Research Institute, New Delhi.
ICH	—Ishida Collection, Hokkaido University.
IZUI	—Institut für Zoologie der Universität, Innsbruck.
JSB	—J.S. Bhatti Collection, Delhi.
NHM	—Naturhistorisches Museum, Vienna.
NHMB	—Natural History Museum, Basel.
NR	—Naturhistoriska Riksmuseet, Stockholm.
NZAC	—New Zealand Arthropod Collection, Auckland.
QM	—Queensland Museum, Brisbane.
Reyes	—C.P. Reyes Collection, University of the Philippines, Los Banos Museum of Natural History, Laguna.
Saki	—K. Sakimura Collection, Hawaii.
SMF	—Senckenberg Museum, Frankfurt.
SO	—Shūji Okajima Collection, Tokyo Agricultural University.
TNA	—T.N. Ananthakrishnan Collection, Loyola College, Madras.
USNM	—United States National Museum of Natural History, Washington.
ZSI	—Zoological Survey of India, Calcutta.
ZWG	—Zhang Wai-Qiu Collection, South China Agricultural College, Guangzhou.

THRIPS AND RELATED GENERA IN THE ORIENTAL AND PACIFIC REGIONS

Following the comprehensive description and definition of the genus *Thrips* by Bhatti (1980), the grass-feeding genera related to *Thrips* were discussed by Bhatti & Mound (1980) and the genus group was defined by Mound & Palmer (1981). Ten genera related to *Thrips* and found in the Oriental and Pacific Regions are included in these works: *Adelphithrips*, described by Mound & Palmer (1981) from the *Nothofagus*

forests of New Zealand is considered to be the sister-group of the *Thrips* genus-group and differs from it in the scattered distribution of microtrichia laterally on the tergites and the propinquity of the median tergal setae; *Bolacothrips*, a grass-living genus, was excluded from the genus group by Bhatti & Mound (1980) presumably because it has a simple, not forked, sense cone on each of antennal segments III and IV; *Ctenidothrips* (monotypic) found on bamboo in India, is distinguished by its large fore femora, toothed sternal craspedum and short median metanotal setae; *Ernothrips* (monotypic) known from India and Java, is distinguished by its smooth flanges of tergal and sternal craspeda; *Fulmekiola* (monotypic) common on sugar-cane throughout the Orient and a pest in Mauritius and the West Indies, may be distinguished by its long antecellar setae (II) and large, lobed tergal (including tergite VIII) and sternal craspeda. *Microcephalothrips* (monotypic) common in flowers of Compositae throughout the tropics, subtropics and the USA, is distinguished by its lobed tergal craspeda; *Oxyrrhinothrips* (monotypic) known only from the type series collected from *Macaranga tanarius* on Sebesie in Indonesia, is distinguished mainly by its long, pointed mouthcone, dense fringe of microtrichia laterally and the posteromarginal craspeda on the tergites. *Plesiothrips* is grass-living but was excluded from the *Thrips* genus-group by Bhatti & Mound (1980) presumably mainly because it has very poorly developed ovipositor and tergal ctenidia; *Sphaeropothrips* (= *Ednathrips*) (monotypic) a European grass-living genus also known from India, is distinguished mainly by the absence of mesothoracic sternopleural sutures; *Stenchaetothrips*, a grass-leaf feeding genus, tropical but mostly Oriental, is distinguished mainly by its long antecellar setae (II).

The majority of *Thrips* species and all related genera have seta b2 on tergites III to VIII long, in contrast to species of *Frankliniella* and related genera where b2 is shorter on tergites III to VII. Seta b3 is normally short on tergites VI to VIII in all these genera. The genus *Thrips* may be distinguished from all other Thysanoptera genera found in the Oriental and Pacific Regions by the following combination of characteristics: antennae 7- or 8-segmented, III and IV each with a forked sense cone (Figs 1, 42–44, 143). Anterior pair of ocellar setae (I) absent; lateral pair (II) shorter than the interocellars (III); postocular setae usually in an even row (figs 2, 3, 12, 13 etc.). Mesothoracic sternopleural sutures present. Tergites V to VIII with a row of microtrichia (ctenidium) laterally; tergite VIII ctenidia

situated posterior and median to the spiracles (Figs 51–55 etc.). Tergites and sternites without a deep or lobed posteromarginal flange (craspedum).

A number of species in this work have been placed, at some time, in subgenera of *Thrips* or *Taeniothrips* or in distinct genera, notably *Thrips* (*Epithrips*) *unispinus* Moulton, *Taeniothrips* (*Isochaetothrips*) *seticollis* Bagnall, *Isoneurothrips australis* Bagnall, *Thrips* (*Isothrips*) *orientalis* Bagnall and *Ramaswamiahiella subnudula* Karny. Although these species have particularly distinctive characteristics, it does not help in the understanding of species or generic relationships to exclude them from this study nor, indeed, to isolate them in monobasic genera, from a hopefully monophyletic genus.

CHARACTERS STUDIED

Size and colour. Size is fairly uniform throughout the genus and within the most common and variable species the largest and darkest specimens are seldom more than 1.3 times as big as the smallest and palest. Males are generally smaller than their females but allometric growth patterns are not apparent in the genus. In the Oriental Region one of the smallest species, about 1 mm long, is *subnudula* (group IV) and amongst the largest, almost 2.5 mm long, are *gardeniae* and *tristis* (group V). Actual measurements are given here for few species but relative sizes may be judged from the illustrations.

Colour is often variable and antennal colour is particularly difficult to interpret. This problem is discussed in the *sumatrensis* species group (group V). Some species, often the more common, have both brown forms and yellow forms and are sometimes bicoloured e.g. *tabaci* and *flavus* (group II), *imuginis* (group IV) and *coloratus* and *hawaiiensis* (group V). Some species which have brown females have yellow males. This characteristic could cast doubt on the synonymy of *morindae* with *javanicus* (group II). There are some species, however, that have constant distinctive coloration. *T. latis* (group I), *taurus* (group II) and *arorai* (group V) all have banded forewings; *atactus*, *carthami*, *dorax* and *garudus* (group II), *australis*, *cedri* and *facetis* (group IV) all have a particularly recognisable colour pattern.

Antennae. Most species consistently have either 7- or 8-segmented antennae, the apical style comprising one or two small segments respectively (Figs 42, 103–105, 143). This is the most

easily used antennal character but a few species have both 1- and 2-segmented styles, e.g. *flavus* (group II), *obscuratus* (group IV), *florum*, *hawaiiensis* and possibly *wedeliae* (group V). Segments III to VI may differ slightly in size and shape between species and the sense cones on III and IV may vary in length between species. *T. australis* may be recognised by its unusually shaped segment VI (fig. 105).

Head. Normally as broad as or broader than long but two species, *alliorum*, common around the north Pacific on onions and *phormiicola* on *Phormium* in New Zealand (group IV), have particularly long heads (Figs 72, 81) reminiscent of many grass-living Thysanoptera. The apparent length of the mouthcone can be affected by orientation of the head and telescoping of the head into the pronotum. This may have caused confusion in the recognition of *beharensis* (group II). Thripidae typically have 3 pairs of ocellar setae but in *Thrips* the anterior pair (I) is always absent; II is situated laterally near the eye; III is situated either within the triangle formed by the ocelli (Figs 13, 19, 60 etc.) or just outside its lateral margins (Figs 2, 12, 17 etc.). The position of pair III is often a valuable distinguishing characteristic and, apart from body size, is the main distinction between the two common species *palmi* and *flavus* (group II) (Figs 19, 20) but caution is necessary as it is sometimes variable, e.g. *alius* (group I) and *longiceps* (group V). The length of pair III is not usually significant but they are remarkably long in *ceruo* (group II) (Fig. 21). The postocular setae, a row of setae behind the hind margin of the eye, sometimes have useful taxonomic characteristics. The median pair (I) may be displaced posteriorly, e.g. *alliorum* (Fig. 72) or the sub-median pair (II) may be similarly displaced, e.g. *vulgatissimus* (group IV). The relative lengths of postocular setae I, II and III may also help in distinguishing between closely related species as in the *hawaiiensis* species group (group V) (Figs 120, 121).

Pronotum. Usually more or less transversely striate but striations are absent in some species, e.g. *rapaensis* (group II). There are usually 2 pairs of long posteroangular setae on each posterior angle but occasionally one or both of these are short or not developed any more than the discal setae, e.g. *melastomae* (Fig. 117) and *unispinus* (Fig. 129) (group V). This variation is discussed on p. 9 and under *imuginis* (group IV). The density of discal setae is a useful characteristic as in the number of posteromarginal setae between the inner posteroangular setae. The Oriental

species normally have 3 pairs of posteromarginal setae but 4 to 6 pairs may be found in *imaginis* (Fig. 77) and *subnudula* (Fig. 79) (group IV).

Metanotum. Sculpture may be distinctive, striate (Figs 27, 28, 101, 134 etc.) or reticulate, with (Figs 7, 8, 66, 139 etc.) or without wrinkles within the reticulations (Figs 6, 94, 136 etc.). Although usually a reliable character it is sometimes variable, e.g. *alius* (group I) (Fig. 4) and *rhabdotus* (group II) (Figs 32, 33). The presence or absence of a pair of campaniform sensilla in the posterior half of the metanotum is usually relatively stable within species of *Thrips*, (although they are sometimes difficult to see), and is one of the distinguishing features within the *formosanus*, *rostratus*, *obscuripes* group (group II) (Figs 27, 29, 34). However, Strauss (1988) shows that this characteristic may not always be reliable. There are normally 2 pairs of setae at or near the anterior margin. The lateral pair are fairly uniform in length and position but the median pair of setae usually provide useful distinguishing characteristics. They may be situated at the anterior margin (Figs. 35, 130, 140 etc.), slightly posterior (Figs 25, 101) or far back from the margin (Figs 4–8, 26–33 etc.). Their position is usually stable within species but is occasionally variable, e.g. in *coloratus* (group V). They are also usually situated equidistant from the lateral setae or slightly closer to them than to each other. However, in *brevistylus* and *pavettiae* (group V) they are very much closer together (Figs 132, 138). The median setae are usually much longer than the laterals but they are particularly short in *evulgo* (group IV) (Fig. 96).

Wings. The majority of *Thrips* are macropterous in both sexes and in the Oriental and Pacific Regions it is only *nigropilosus* (group II) and *phormiicola* (group IV) that may be brachypterous or micropterous. Fully developed forewings have 2 longitudinal seta-bearing veins. The hind vein normally has a more or less complete row of setae but that of the first vein varies (Figs 10, 11, 45). Most commonly the setae are arranged in a basal group of 7 and 3 more widely spaced along the distal half. Even if there are more distal setae there is usually a gap after the basal group of 7. Some species have a complete row of first vein setae. These setal arrangements are normally relatively stable but *orientalis* (group III) is particularly variable. The forewing scale usually bears 5 setae with the apical seta longer than the subapical but sometimes there are more setae, e.g. *australis* and *subnudula* (group IV) and the apical setae may be shorter than the subapical,

e.g. *orientalis* and *setipennis* (group III).

Legs. *T. seticollis* (group II) and *T. coprosmae* (group IV) share the rare characteristic of having a pretarsal claw on the forelegs (Fig. 108). It is also found in *calcaratus* (Uzel) from Europe and North America and possibly *alysii* Hood from North America, and is often difficult to observe.

Abdomen. Tergites III to VIII b2 setae are long and tergites VI to VIII b3 setae short except in an undescribed species similar to *imaginis* which has b2 setae short on tergites VI and VII, and *subnudula* and another similar but undescribed species which have b3 setae long on tergites VI and VII (group IV). Tergite II may have 3 or 4 lateral setae but caution is necessary as the 4th seta is often displaced onto the pleurite (Figs. 49, 50). The posteromarginal comb on tergite VIII may be entirely absent, there may be a few microtrichia only laterally (Fig. 64), it may be complete but with microtrichia short and sparse or irregularly spaced (Figs. 52, 54, 86, 146, 147 etc.) or it may be a complete, regular comb of long, fine microtrichia (Figs 53, 55, 89 etc.). Even if the female of a species has a well developed comb it may be absent in the male. Tergites IX & X are usually about equal in length but they are particularly long in *longicaudatus* (group V) (Fig. 152) and IX is particularly short in *facetus* (group IV) (Fig. 84). Male tergite IX bears 2 pairs of setae in the distal half usually near the posterior margin and the relative lengths and positions of the median (b1) and submedian (b2) setae are useful diagnostic features (Figs. 109–111 etc.). Sternite II usually bears 2 pairs of posteromarginal setae but in 4 New Zealand species, *austellus*, *coprosmae*, *obscuratus* and *phormiicola* (group IV) and 2 New Caledonian species, *bianchii* and *insignis* (group I), there are 3 pairs. Sternites III to VII usually bear 3 pairs of posteromarginal setae but *imaginis* has more than 3 pairs and *subnudula* has 6 pairs (both group IV) (Fig. 82). Sternites often also bear discal setae (Figs. 82, 83), the quantity and length of which can be useful diagnostic features but they are particularly variable in *orientalis* (group III). Pleurotergites also sometimes bear discal setae in addition to the 1 posteromarginal seta (Figs. 106, 107) and various types of sculpture (Figs. 47, 48). In Oriental species the most common distribution of discal setae is on sternites II or III to VII although absent from the pleurotergites (group V). Less commonly discal setae are found on the pleurotergites as well (group IV). In a few species they are found on sternites II or III to VI only (group III) and

rarely are they found on the pleurotergites only: *brunneus*, *setosus* and *xenos* (group II in part). Discal setae are particularly numerous in a few species: *apicatus*, *australis*, *facetis*, *imuginis* and *subnudula* (group IV) all have at least 20 sternal discal setae and 5 or 6 on the pleurotergites. Males tend to have comparatively fewer discal setae. With 5 exceptions, males of Oriental *Thrips* have a glandular area on each of sternites III to VII (Figs 56, 150, 151). They are usually narrowly or broadly transverse but they vary from small and almost circular, as in *longiceps*, to occupying most of the sternite, as in *simplex* (group V). *T. tabaci* and *flavidulus* have a transverse glandular area on each of sternites III to V only, *carthami* (group II) has them on III to VI, *coprosmae* (group IV) has them on IV or V to VII only and *xenos* (group II) is unique in the genus in having each gland dissected into 5 to 8 small, irregular patches. Due to distortions of the preparation technique, the precise nature of the ovipositor is difficult to assess but in 4 species, *facetis* (group IV), *hispidus*, *leeuweni* and *longicaudatus* (group V), it appears to extend beyond the end of the abdomen.

CHECKLIST OF SPECIES

Group I

- alius* sp.n. [♂ ♀] Philippines, China
beta sp.n. [♂] New Guinea
bianchii Sakimura [♂ ♀] New Caledonia
insignis Bianchi [♂] New Caledonia
javanicus Priesner
morindae Priesner syn.n. [♂ ♀] Java, Malaya
latis Bhatti
ignobilis Ananthakrishnan & Jagadish [♂ ♀] India
malloti Priesner
addendus Priesner
rosaceae Moulton [♂ ♀] Malaya, Sumatra, Java, New Guinea, Queensland, Bali, Celebes, Solomon Is, Philippines, Okinawa, Caroline, Palau, Taiwan, India
pallisetis Sakimura [♂] Australia
reticulatus Moulton [♂ ♀] New Guinea

Group II

- alatus* Bhatti [♂ ♀] India, Nepal
atactus Bhatti [♂] India
beharensis Ramakrishna & Margabandhu [♂ ♀] India
brunneus Ishida [♂ ♀] Japan
carthami Shumsher [♂ ♀] India, Kashmir, Pakistan, Bhutan
ceruo sp.n.
conocephali Priesner [♂] Java
dorax Bhatti [♂] India
flavidulus Bagnall [♂ ♀] India, Nepal, China

flavus Schrank

- clarus* Moulton (*Taeniothrips*) syn.n.
saussaureae Ishida (*Taeniothrips*) [♂ ♀] Nepal, Pakistan, India, Thailand, China, Taiwan, Japan, Korea, Philippine Is, Malaya, Australia; also Europe, Africa, North America
formosanus Priesner [♂] India, Taiwan, China
fuscicornis Ishida
garuda Bhatti [♂] India
himalayanus Pelikan [♂] Nepal, China
kodaikanalensis Ananthakrishnan & Jagadish
exhuberans Ananthakrishnan & Jagadish [♂ ♀] India
levatus Bhatti [♂ ♀] India, Thailand
modicus Bianchi [♂ ♀] Samoa
nigropilosus Uzel [♂ ♀] China, Korea, Japan, Philippines, Hawaii, Fiji, New Zealand, Australia; also Europe, E. Africa, Mauritius, North America
obscuripes Priesner [♂ ♀] Java
pallidulus Bagnall [♂ ♀] India, China
palmi Karny
clarus Moulton [*Thrips*] [♂ ♀] Sudan, Mauritius, Reunion, Pakistan, India, Bangladesh, Thailand, China, Hong Kong, Taiwan, Japan, Korea, Malaya, Singapore, Sumatra, Java, Brunei, Philippines, Australia NT, Wallis, New Caledonia, Samoa, Guam, Hawaii, Guadeloupe, Martinique, St Kitts, Trinidad
pectiniprivus Priesner [♂ ♀] Krakatau
rapaensis Moulton [♂] Rapa I
rhabdotus Sakimura [♂ ♀] Tonga, Fiji
rostratus Priesner [♂] Java, Celebes, Bali
seticollis Bagnall [♂ ♀] Australia
setosus Moulton [♂ ♀] Japan, Korea, China
tabaci Lindeman [♂ ♀] worldwide
tanicus Bhatti [♂ ♀] India
taurus Bhatti [♂] India
tectus zur Strassen [♂ ♀] Bhutan, Nepal
xenos Bhatti [♂ ♀] India

Group III

- compressicornis* Sakimura [♂ ♀] Marquesan Is, Malaya
decens sp.n. [♂ ♀] Malaya
extensicornis Priesner [♂ ♀] Taiwan, Java, Riouw Arch, Philippines
orientalis Bagnall
setipennis Steinweden & Moulton [♂ ♀] India, Thailand, China, Japan, Malaya, Java, Philippines, Borneo, Sarawak, Tahiti, Hawaii
parvispinus Karny
jenseni Karny [♂ ♀] Thailand, Malaya, Singapore, Sumatra, Java, Philippines, Celebes, New Guinea, Solomon Is, Torres St, Queensland
setipennis Bagnall
myrsiniicola Bagnall [♂ ♀] Australia, Tasmania
taiwanus Takahashi
pallipes Moulton [♂ ♀] China, Thailand, Taiwan, Bali, Philippines, Malaya

Group IV

alliorum Priesner

carteri Moulton [♂ ♀] China, Taiwan, Japan, Korea, Manchuria, Hawaii

apicatus Priesner [♂ ♀] India, Thailand, Philippines

austellus Mound [♂] New Zealand

australis Bagnall [♂ ♀] worldwide

cedri Bhatti [♂] India

coprosmae Mound [♂ ♀] New Zealand

evulgo sp.n. [] Pakistan

facetis sp.n. [♂] Bangladesh, Malaya

imaginis Bagnall [♂ ♀] New Guinea, Australia, Tasmania, New Caledonia, New Zealand, Fiji

meridionalis Priesner [♂ ♀] mainly Mediterranean distribution. Africa, Europe, Central Asia, Nepal

novocaledonensis Bianchi [♂ ♀] New Caledonia, New Hebrides, Norfolk I

obscuratus Crawford [♂ ♀] New Zealand

phormiicola Mound [♂ ♀] New Zealand

subnudula Karny [♂ ♀] Pakistan, India, Bali, Philippines, Nigeria, Uganda

vulgatissimus Haliday [♂ ♀] China, New Zealand; also Europe, North America

Group V

aleuritidis Moulton & Steinweden [♂ ♀] Tahiti

andrewsi Bagnall [♂ ♀] India, China

arorai Bhatti [♂] India

brevistylus Priesner [♂ ♀] Java, Philippines

cinchonae Priesner [♂] Java

coloratus Schmutz

aligherini Girault

japonicus Bagnall

melanurus Bagnall [♂ ♀] Pakistan, India, Ceylon, Thailand, Laos, China, Taiwan, Japan, Malaya, Java, Celebes, Philippines, Brunei, New Guinea, Queensland

emulatus Ananthakrishnan [♂ ♀] India, S.W. Africa

florum Schmutz [♂ ♀] throughout the Oriental and Pacific Regions

fulmeki Priesner [♂] Sumatra

gardeniae sp.n. [♂ ♀] New Guinea, Solomon Is

griseus Bagnall [♂] Japan

hawaiiensis Morgan [♂ ♀] throughout the Oriental and Pacific Regions, northern Australia, southern and eastern USA

hispidus Ananthakrishnan & Jagadish [♂] India

kotoshoi Moulton [♂] China, Taiwan, Fiji

leeuweni Priesner [♂] Malaya, Singapore

longicaudatus Bianchi [♂] South Australia, Queensland, Samoa, New Guinea, Philippines

longiceps Bagnall [♂ ♀] India

melastomae Priesner [♂ ♀] Thailand, Malaya, Sumatra, Java, Riouw Arch, Philippines

Reyes (in press) [♂] Philippines

pavettae Priesner [♂ ♀] Sumatra, Java

samoensis Moulton [♂] Samoa, New Hebrides

simplex Morison [♂ ♀] India, China, Hong Kong, Japan, Hawaii, Philippines, New Guinea, Australia, New Zealand; also Europe, Africa and the Americas

sumatrensis Priesner [♂ ♀] Thailand, Sumatra, Java, Timor, Guam, Philippines, Tahiti

tristis Priesner [♂ ♀] Java

unispinus Moulton [♂ ♀] Solomon Is, New Guinea, Brunei, Queensland

unonae Priesner [♂] Java

vitticornis Karny

canavaliae Moulton [♂ ♀] India, China, Thailand, Vietnam, Taiwan, Philippines, Malaya, Sumatra, Java, Solomon Is, New Hebrides, Tonga, Fiji, Samoa, Guam, Marshall Is, Palau I, Botel, Tobago, Verlaten, Krakatau, Tambaram, Torres St, Hawaii

wedeliae Priesner [♂] Taiwan, Solomon Is, Timor, Philippines

NOMINAL SPECIES REMOVED FROM THRIPS

allia Moulton, 1936: 267. Holotype ♂, [Taeniothrips], PHILIPPINES, (CAS). Transferred to *Ceratothrips* by Bhatti, 1978: 194. [not examined].

armatus Moulton, 1936: 271. Holotype ♂, [Thrips], PHILIPPINES, (CAS). Labelled as *Baliothrips serratus* (Kobus) by Sakimura (= *Fulmekiola*) but synonymy apparently not published. [Holotype and 2♂, 6♀ paratypes examined]. **Syn. nov.**

carteri Moulton, 1937: 411. Holotype ♂, [Isoneurothrips], HAWAII, (CAS). Transferred to *Neurothrips* by Sakimura, 1967a: 422. [not examined].

calopgomi Zhang Wai-qi, 1981: 325. Holotype ♂, [Taeniothrips], CHINA, (ZWG). This species has a long mouthcone, all abdominal tergites and sternites with posteromarginal craspeda, tergal ctenidia absent. It is here transferred to *Tusothrips*. [Holotype and 2♂ paratypes examined]. **Comb. nov.**

fusca Moulton, 1936: 270. Cotypes ♂, ♀, [Thrips *tusca*, sic. see Gentile & Bailey, 1968: 67], PHILIPPINES, (CAS). Described from seedling cane, presumably sugar, it has long ocellar setae II and belongs in *Stenchaetothrips*. [3♂, 1♀ cotypes examined]. **Comb. nov.**

karafutensis Ishida, 1931: 36. Holotype ♂, [Taeniothrips], JAPAN, (ICH). Synonymised with *Sericothrips gracilicornis* Williams by Kudô, 1979: 490. [not examined].

konumensis Ishida, 1931: 37–39. Holotype ♂, [Taeniothrips], JAPAN, (ICH). Synonymised with *Odonthrips biuncus* John by Kudô, 1979: 489. [not examined].

karnyanus Priesner, 1934: 282–283. lectotype ♂, [Thrips], JAVA, (SMF), [labelled by Bhatti, 1978. Transferred to *Stenchaetothrips* by Bhatti & Mound, 1980–15. [examined].

koitakii Moulton, 1940: 253. Holotype ♂, [Thrips], NEW GUINEA, (BPBM). This species has 3 pairs of ocellar setae and is therefore not a *Thrips*. It was described from *Saccharum* and is more similar to

Stenchaetothrips in many ways. Its coloration is similar to *S. bicolor* but it is not congeneric with it. [3♂ paratypes examined].

mucunae Ishida, 1934: 57–59. Holotype ♂, [*Thrips*], JAPAN, (ICH). Transferred to *Baliothrips* by Kudô, 1979: 488–489. Transferred to *Stenchaetothrips* by Bhatti & Mound, 1980: 16. [Holotype and 1♂ paratype examined].

paradoxa Linnaeus, 1763: 401. Unknown, [*Thrips*], CHINA, (unknown). From the original description it is obviously not a Thysanopteran and is most likely to be a Coleopteran.

sacchari Kruger, 1890: 103–106. Syntypes ♂, ♀, [*Thrips*], JAVA, MALAYA, (Depository unknown). Transferred to *Stenchaetothrips* by Bhatti, 1982: 411. [not examined].

setifer Karny, 1920: 38. Lectotype ♂, [*Isoneurothrips*], AUSTRALIA, (NR). Transferred to *Parabaliotrips* by Mound & Houston, 1987: 7. [1♂ paralectotype examined].

victoriensis Moulton, 1936: 270. Holotype ♂, [*Thrips*], PHILIPPINES, (CAS). Labelled as *Baliothrips* by Sakimura and should now be regarded as a *Stenchaetothrips* similar to *faurei*. [examined]. **Comb. nov.**

SPECIES NOT EXAMINED

coreanus Woo, 1974: 47–48. Holotype ♂, [*Taeniothrips*], KOREA, (Seoul National University, Suweon).

Floreus Kurosawa, 1968: 32–33. Holotype ♂, [*Thrips*], JAPAN, (National Institute of Agricultural Sciences, Tokyo).

inferus Chen, 1979: 423. Holotype ♂, [*Thrips*], TAIWAN, (Bureau of Commodity Inspection and quarantine, Taipei).

dealatus Priesner, 1928: 43–45. Holotype ♂ [*Taeniothrips*], JAVA, (Hamburg, lost). From the original description and illustration it can be seen to be an unusual species with 8-segmented antennae; 2 pairs of ocellar setae; pronotal anteromarginal setae and inner posteroangular setae much longer than the outer pair; tergite VIII posteromarginal comb absent. There are, however, no characteristics given to place it definitely in either *Thrips* or *Taeniothrips* as presently recognised (Bhatti, 1978 and Mound & Palmer, 1981). This species has therefore been omitted here although described from 'the region of study. **Nomen dubium.**

INTRODUCTION AND KEY TO GROUPS

Key to groups

- 1 Abdominal sternite VII always without discal setae (cf. Fig. 46); [tergite VIII posteromarginal comb usually absent medially (Fig. 64) or complete and of evenly spaced microtrichia (Figs 51, 53, 55)] (groups I, II, III) 2
- Abdominal sternites III–VII always with discal setae (Figs 82, 83); [tergite VIII posteromarginal comb usually present but often of irregularly spaced microtrichia (Figs 85, 86, 147)] (groups IV, V) .. 4
- 2 Abdominal sternites III–VI usually with discal setae (cf. Figs 82, 83); [metanotal sculpture usually distinctly polygonally reticulate (figs 66–68); tergite VIII posteromarginal comb rarely present medially] group III (p. 35)
- Abdominal sternites always without discal setae (Fig. 46) 3
- 3 Metanotal sculpture distinctly reticulate (Figs 4–8); [tergite VIII posteromarginal comb usually absent medially] group I (p. 19)
- Metanotal sculpture longitudinally striate, sometimes with a few reticulations medially (Figs 24–37); [tergite VIII posteromarginal comb usually complete and of long, regularly spaced microtrichia (Figs 51, 55)] group II (p. 24)
- 4 Abdominal pleurotergites with discal setae, often less numerous in males but 1 or 2 pleurites always with 1 or 2 discal setae (Figs 106, 107) .. group IV (p. 38)
- Abdominal pleurotergites always without discal setae (cf. Figs 47, 48) group V (p. 46)

Group characteristics are summarised in Table 1.

The 91 species considered here appear to fall into five relatively distinct taxonomic groups (keyed above), essentially those with or without sternal and pleurotergal discal setae and reticulate or striate metanotal sculpture. These groups, however, do not necessarily reflect phylogenetic relationships (see p. 60). By far the most common combinations of characteristics in the Oriental and Pacific Regions are: all sternites and pleurotergites without discal setae and metanotal sculpture longitudinally striate (group II); sternites III–VII with discal setae, pleurotergites without discal setae and metanotal sculpture usually striate or with a few reticulations medially (group V). It is interesting to compare the New World, European and what is known of the African faunas with regard to these 5 groups (Table 2).

The two smallest groups, I and III, appear to be essentially Austro-oriental in origin with *ori-*

entalis being the most widespread and common species. None of the species is yet of economic significance.

Group II, the largest group of all, is most diverse in the northern temperate regions and accounts for more than half of the North American and European faunas. Its representatives in the Oriental and Pacific faunas are mostly endemic species from the cooler areas of India and four others with a more or less worldwide distribution and are of notable economic significance: *flavus*, *nigropilosus*, *palmi* and *tabaci*. This group also contains species with the rare combination of pleurotergal discal setae but no sternal discs. These comprise 9 species from the American fauna; *brevicornis*, *fulvipes* and *her-ricki* from Europe; *brunneus*, *setosus* and *xenos* from this study. The Oriental and Pacific faunas may also contain a larger Palaearctic element, yet to be recorded, belonging mainly to this group.

Group IV contains a large proportion of the African fauna and most of the New Zealand species. The palaearctic species *meridionalis* also belongs here with *vulgatissimus* and *atratus* which are holarctic, and *australis*, probably an Australian species now found in the warmer areas of the world wherever *Eucalyptus* is grown. Species with the potential to have particular economic significance in this group are *alliorum*, common on onions, *imuginis*, the plague thrips of Australian fruit trees, and *obscuratus*, its New Zealand equivalent.

Species of group V are well distributed throughout the region of study. They represent the highest proportion of the Old World Tropics' fauna and include most of the endemic African and Austro-oriental species. The worldwide gladiolus thrips, *simplex*, and the Oriental banana and oil palm pest and pollinator species, *florum* and *hawaiiensis*, also belong in this group.

Although these groups appear to have not only taxonomic but also biological, geographical and some phylogenetic significance, the boundaries between them are not always clear. It is possible that some species are more closely related to those in another group than to the rest of their own group, as is discussed under 'Phylogenetic considerations' (p. 60). Such situations may occur between groups I and III with *decens*, *extensicornis* and *orientalis*, and between groups IV and V with *alliorum* and *novocaledonensis* (Table 1) and the *unispinus* group summarised in Table 3.

The undescribed species E in this table is represented by a single ♂ from Tanah Rata and 1♂ from Taiwan (SO). They have pleurotergal

discal setae and are very similar to *imuginis* and *subnudula* but have both pairs of pronotal posteroangular setae short, little longer than the discs, and a more distinctly reticulate metanotum like that of *unispinus*. The undescribed species B in this table is represented by a series of 9♂, 5♀ from New Guinea (BMNH). These specimens are almost identical to *imuginis* but are without pleurotergal discal setae. The males have a transverse glandular area on each of sternites III–VII; tergite VIII posteromarginal comb absent; IX b1 setae shorter than b2 and closer to b2 than to each other. They belong, therefore, in group V, possibly related to the *unispinus* group. There are a number of species complexes in *Thrips* which are highlighted throughout the text but this is perhaps the most difficult to resolve. It may indicate some instability in the characteristics examined and this should always be borne in mind when using identification keys and recording new species.

KEY TO ORIENTAL AND PACIFIC
THRIPS SPECIES FEMALES (Key to
males p. 15)

N.B. A few species appear more than once in the key due to morphological variation. The female of *fuscicornis* in group II is unknown.

Females

- 1 Abdominal sternites without discal setae (Figs 9, 46) Groups I & II 2
 - Abdominal sternites with at least 1 pair of discal setae (Figs 82, 83) Groups III, IV, V 42
- 2 Metanotal sculpture distinctly reticulate (Figs 4–8)
Group I 3
 - Metanotal sculpture usually striate, sometimes with a few reticulations medially (Figs 24–37) Group II 15
- 3 Metanotal sculpture of distinctive, elongate reticulations (Figs 4, 7) 4
 - Metanotal sculpture polygonally reticulate, not elongate (Figs 5, 6, 8) 6
- 4 Forewings completely pale, first vein with a complete row of setae (cf. Fig. 10) *pallisetis*
 - Forewings dark with pale base, first vein usually with more than 7 basal and 3 distal setae but not a complete row (Fig. 11) 5
- 5 Ocellar setae III situated inside ocellar triangle (cf. Figs 3, 13) *javanicus*
 - Ocellar setae III situated outside ocellar triangle (Fig. 2) *alius* sp.n. in part

- 6 Antennae 8-segmented (cf. Fig. 143); sternite II with 3 pairs of posteromarginal setae; [posteromarginal comb on abdominal tergite VIII present medially (cf. Figs 53, 54); reticulations of metanotal sculpture clear, without internal wrinkles (Fig. 6); forewings usually with a complete row of first vein setae (cf. Fig. 10)] 7
- Antennae 8-segmented (cf. Fig. 143); sternite II with 3 pairs of posteromarginal setae; [posteromarginal comb on abdominal tergite VIII present medially (cf. Figs 53, 54); reticulations of metanotal sculpture clear, without internal wrinkles (Fig. 6); forewings usually with a complete row of first vein setae (cf. Fig. 10)] 7
- Antennae 7-segmented (cf. Fig. 42); sternite II with 2 pairs of posteromarginal setae; [comb often absent medially (cf. Figs 52, 64); reticulations of metanotal sculpture often with internal wrinkles (Fig. 8) (very slight in *extensicornis*); number of forewing first vein setae various] 8
- 7 Tergite VIII posteromarginal comb of long and fine microtrichia; antennae short; yellow species *insignis*
- Tergite VIII posteromarginal comb of very short microtrichia antennae long; brown species *bianchii*
- 8 Forewings completely dark; sternites usually with at least 1 pair of discal setae; [metanotal campaniform sensilla absent (Figs 67, 68)] 9
- Forewings dark with at least base pale; sternites without discal setae; [metanotal campaniform sensilla absent or present (Figs 5, 8)] 10
- 9 Ocellar setae III situated outside ocellar triangle (Fig. 61); forewing first vein usually with an almost complete row of setae (cf. Fig. 10) *orientalis* in part
- Ocellar setae III situated inside ocellar triangle (Fig. 60); forewing first vein with 7 basal and 3 distal setae *extensicornis* in part
- 10 Sternite VII median setae situated on posterior margin (Fig. 96); [metanotal campaniform sensilla present] 11
- Sternite VII median setae situated in front of posterior margin (Fig. 9a) 12
- 11 Brown species; forewing dark with base pale, first vein with three distal setae; antennal segments I & II brown: tergite VIII comb absent medially; metanotal sculpture arranged almost in a whorl (Fig. 5); pronotum with 3 pairs of posteromarginal setae, inner posteroangular setae distinctly longer than outer pair *beta* sp.n.
- Yellow species; forewing pale with a narrow, darker band near base, first vein with 6 distal setae; antennal segments I & II pale; tergite VIII comb complete; metanotal sculpture broadly elongate; pronotum with 4 pairs of posteromarginal setae, posteroangular setae subequal *taurus*
- 12 Antennal sense cones long, those on III & IV reaching well into apical half of IV & V respectively; [forewing first vein with 3 distal setae; ocellar setae III situated inside ocellar triangle (Fig. 13); metanotal campaniform sensilla absent (Fig. 8); tergite VIII comb complete] *reticulatus*
- Sense cones short, reaching no further than basal quarter of subsequent segment (Fig. 1); [forewing first vein usually with 4 or more distal setae, or with 2; ocellar setae III situated usually outside triangle, near anterior margin; metanotal campaniform sensilla present or absent] 13
- 13 Yellow species; forewing pale with 2 narrow dark bands; first vein with 2 distal setae; tergite II with 4 lateral setae (cf. Fig. 49); tergite VIII comb complete; [metanotal campaniform sensilla absent] *latis*
- Brown species; forewing dark with only base pale; first vein with 3 or more distal setae; tergite II with 3 lateral setae (cf. Fig. 50); tergite VIII comb absent at least medially 14
- 14 Forewing first vein with an almost complete row of setae; metanotal sculpture polygonally reticulate (cf. Figs 67, 68), campaniform sensilla present (cf. Figs 5, 6) *malloti*
- Forewing first vein with 7 basal and 3–6 distal setae; metanotal sculpture of poorly formed elongate reticulations, sensilla absent (Fig. 4) . *alius* sp.n. in part
- 15 Median metanotal setae situated on anterior margin of segment (Figs 25, 35); antennae 8-segmented 16
- Median metanotal setae situated behind anterior margin (Figs 26–34 etc); antennae often 7-segmented 18
- 16 Forewing first vein with 3 distal setae *himalayanus*
- Forewing first vein with a complete row of evenly spaced setae 17
- 17 Metanotal sculpture closely striate (Fig. 35); posteromarginal comb on tergite VIII of long, fine microtrichia, complete, sometimes with a few teeth missing medially (cf. Fig. 55); ocellar setae III short, little longer than the distance between their bases (Fig. 39) *seticolis*
- Metanotal sculpture more broadly striate (Fig. 25); posteromarginal comb on tergite VIII absent; ocellar setae III very long, more than 3 times as long as the distance between their bases (Fig. 21) *cerneo* sp.n.
- 18 Posteromarginal comb on tergite VIII complete and of long, fine microtrichia (Figs 53, 55) 19
- Posteromarginal comb usually incomplete or absent, if complete then irregular and usually of very small microtrichia (Figs 52, 54) 35
- 19 Pleurotergites with 1–3 discal setae (cf. Fig. 107); [tergite II with 3 lateral marginal setae (Fig. 50)] 20
- Pleurotergites without discal setae (Figs 47, 48); [tergite II with 3 or 4 lateral marginal setae (Figs 49,

- 50)] 22
- 20 Yellow species; forewings pale; pronotum with 2 pairs of posteromarginal setae; metanotal campaniform sensilla absent *xenos*
 – Brown species; forewings dark; pronotum with 3 pairs of posteromarginal setae; metanotal campaniform sensilla present (Fig. 36) 21
- 21 Antennal segment III and base of IV & V pale *setosus*
 – Antennal segments IV & V wholly dark, III slightly paler *brunneus*
- 22 Ocellar setae III situated inside or near margin of ocellar triangle (Figs 19, 41) 23
 – Ocellar setae III situated outside or near margins of ocellar triangle (Figs 18, 20, 22) 25
- 23 Pleurotergites with rows of ciliate microtrichia (Fig. 47); tergite IX with only 1 pair of campaniform sensilla (Fig. 55); forewing first vein with 7 basal and 3–6 (usually 4) distal setae (Fig. 45); tergite II with 3 lateral marginal setae (cf. Fig. 50); metanotal sculpture with a few reticulations medially (Fig. 37); postocular setae all subequal in length (Fig. 41); [antennae 7-segmented (Fig. 42); colour variable, yellow to brown] *tabaci*
 – Pleurotergites without microtrichia (Fig. 48); tergite IX with 2 pairs of campaniform sensilla (cf. Figs 84, 152); forewing first vein with 7 basal and 2–3 distal setae; tergite II with 4 lateral marginal setae (cf. Fig. 49); metanotal sculpture striate; postocular seta II minute, much smaller than I or III (Fig. 19); [antennae 7- or 8-segmented] 24
- 24 Large yellow species; antennal segments IV & V base pale *flavus* and *flavidulus*
 – Large pale brown species; antennal segments IV & V brown *kodaikanalensis*
- 25 Brown species; wings dusky or dark; antennal segments I & II as dark as, or darker than III 26
 – Pale yellow or with some brown markings; wings pale or banded; antennal segments I & II often paler than III 29
- 26 Antennae 8-segmented; [forewing first vein with 4 (3 to 5) distal setae] *tectus*
 – Antennae 7-segmented; [forewing first vein with 3 distal setae] (this group also includes *tanicus*) .. 27
- 27 Antennal segment III pale *formosanus*
 – Antennae completely dark 28
- 28 Ocellar setae III situated near margins of ocellar triangle; metanotal campaniform sensilla present (Fig. 29) *obscuripes*
 – Ocellar setae III further apart, outside ocellar triangle (Fig. 38); metanotal campaniform sensilla absent (Fig. 34) *rostratus*
- 29 Pale yellow species without any brown abdominal markings; [metanotal campaniform sensilla present] 30
 – Yellow or pale brown species with darker abdominal markings 32
- 30 Forewings banded, first vein with 6 distal setae; pronotum with 4 pairs of posteromarginal setae (cf. Figs 71, 77); tergite II with 3 lateral marginal setae (cf. Fig. 50) *taurus*
 – Forewings uniformly pale or dusky; first vein with 2–3 distal setae; pronotum with 3 pairs of posteromarginal setae; tergite II with 4 lateral marginal setae (Fig. 49) 31
- 31 Metanotal sculpture striate, converging posteriorly (Fig. 30); [antennal segment IV base often pale] *palmi*
 – Metanotal sculpture striate, not converging posteriorly; [antennal segment IV brown] *alatus*
 – Metanotal sculpture reticulate medially; [antennal segment IV pale] *pallidulus*
- 32 Metanotal campaniform sensilla present; [forewings pale] *carthami*
 – Metanotal campaniform sensilla absent; [forewings, when fully developed, often banded] 33
- 33 Often micropterous; abdominal tergites with 2 or 3 lines of sculpture between median setae (Fig. 50) *nigropilosus*
 – Macropterous; abdominal tergites unsculptured medially (cf. Fig. 49) 34
- 34 Forewing with distinct dark band; antennal segments all dark *atactus*
 – Forewing with paler dark band; antennal segment I and apex of III pale *garuda*
- 35 Posteromarginal comb on tergite VIII apparently absent medially; metanotal sculpture broadly striate or with some reticulations medially (Fig. 31); [ocellar setae III situated sometimes inside ocellar triangle; forewing first vein with 7 basal and 3–6 distal setae] 36
 – Posteromarginal comb on tergite VIII complete but irregular (Fig. 54); metanotal sculpture closely striate (Figs 28, 32, 33); [ocellar setae III situated outside ocellar triangle (Figs 18, 23); forewing first vein with 3 distal or a complete row of setae] .. 39
- 36 Ocellar setae III situated inside ocellar triangle; yellow species *levatus*
 – Ocellar setae III situated outside or on margins of ocellar triangle (Figs 16, 17); brown species 37
- 37 Reticulations of metanotum often almost polygonal; [with internal wrinkles (Fig. 4)] *alius* sp.n.
 – Metanotal sculpture almost striate or of ill-formed elongate reticulations medially; [with or without wrinkles (Fig. 31, cf. Fig. 133)] 38
- 38 Antennal segments IV & V brown; median metanotal setae situated near anterior margin (cf. Fig. 133); pronotal discal setae numerous (Fig. 17) *conocephali*
 – Antennal segments IV & V bicoloured, pale at base; median metanotal setae situated behind anterior margin (Fig. 31); pronotal discal setae sparser (Fig. 16) *pectiniprivus*

- 39 Forewing pale with a dark band, first vein with 3 distal setae; bicoloured species *dorax*
 – Forewing dark or only base pale, first vein with a complete row of setae: brown species 40
- 40 Metanotal campaniform sensilla absent (Fig. 28); head setae minute, pronotal posteroangular and median metanotal setae short (Fig. 23) ... *modicus*
 – Metanotal sensilla present (Figs 32, 33); head and major setae longer (Fig. 18) 41
- 41 Pronotum with transverse striations *rhabdotus*
 – Pronotum without striations (Fig. 18) ... *rapaensis*
- 42 Sternite VII without discal setae; [pleurotergites without discal setae; metanotal campaniform sensilla absent, median setae usually situated behind anterior margin (Figs 66–68)] Group III 43
 – Sternite VII with discal setae (Fig. 83); [pleurotergites with or without discal setae; metanotal campaniform sensilla present or absent, median setae situated often at anterior margin (Figs 91–102, 131–142)] Groups IV & V 49
- 43 Posteromarginal comb on tergite VIII complete, microtrichia fine and regular; metanotal sculpture closely striate; sternal discal setae, particularly on sternite II, situated near posterior margin (Fig. 65); antennae 8-segmented; [forewing first vein with a complete row of setae] *setipennis*
 – Posteromarginal comb on tergite VIII usually absent medially (Fig. 64), if complete then microtrichia short and irregular; metanotal sculpture reticulate (Figs 66–68); sternal discal setae situated in middle of sclerite, not near posterior margin (cf. Figs 82–83); antennae 7-segmented; [forewing first vein sometimes without a complete row of setae] 44
- 44 Ocellar setae III situated inside ocellar triangle (Figs 59, 60); [forewing first vein with gap in setal row] 45
 – Ocellar setae III situated on or outside margins of ocellar triangle (Figs 61, 62) [forewing first vein usually with a complete row of setae] 46
- 45 Antennal segments IV & V basal half pale; metanotum polygonally reticulate (Fig. 67); forewing first vein with 7 basal and 3 distal setae *extensicornis* in part
 – Antennal segments IV & V brown; metanotal sculpture of smaller elongate reticulations (Fig. 66); forewing first vein with 10–14 basal and 2–3 distal setae *decens* sp.n.
- 46 Forewings completely dark; sternites III–VI with 0–6 discal setae; reticulations of metanotal sculpture with internal wrinkles (Fig. 68) .. *orientalis* in part
 – Forewings dark with base pale; sternites III–VI with 6–14 discal setae; metanotal sculpture without internal wrinkles (cf. Figs 6, 94) 47
- 47 Ocellar setae III situated on margin of ocellar triangle (Fig. 62); sternites with 5–6 pairs of discal setae; median metanotal setae situated near anterior margin; antennae dark, segment III base pale *parvispinus*
 – Ocellar setae III further apart, outside ocellar triangle; sternites with 3–5 pairs of discal setae; median metanotal setae situated further behind anterior margin; at least antennal segment III and base of IV pale 48
- 48 Sternites with 4–5 pairs of discal setae; antennal segment III pale, IV & V bicoloured *taiwanus*
 – Sternites with 3–4 pairs of discal setae; antennal segments I–III and base of IV pale *compressicornis*
- 49 Pleurotergites with discal setae (Figs 106, 107); median metanotal setae situated usually behind anterior margin (Figs 91–102) Group IV 50
 – Pleurotergites without discal setae (cf. Figs 47, 48); median metanotal setae situated often at anterior margin (Figs 130–142) Group V 64
- 50 Forewing first vein with complete or almost complete row of numerous setae; sometimes microppterous or brachypterous 51
 – Forewing first vein with 7 or 8 basal and only 2 or 3 distal setae; always macropterous 55
- 51 Comb on tergite VIII absent medially; apical antennal segments sharply tapering (Fig. 105); sternite II with 2 pairs of posteromarginal setae; sternite VII with more than 20 discal setae (cf. Fig. 83) *australis*
 – Comb on tergite VIII complete but often irregular (Fig. 90); apical antennal segments finely tapering; sternite II with 3 pairs of posteromarginal setae; sternite VII with fewer than 15 discal setae 52
- 52 Antennae completely brown; [metanotal sculpture striate; sternites with 6–14 discal setae; antennae 7- or 8-segmented] *obscuratus*
 – Antennal segments I, II, III or more, paler than the rest; [metanotum with broader striations or a few reticulations medially (Figs 93, 95, 100); sternites with 6–10 discal setae; antennae 7-segmented] . 53
- 53 Metanotal campaniform sensilla absent (Fig. 95); foretarsi with an apical claw; antennal segments III–VII brown, much darker than I or II *coprosmae*
 – Metanotal campaniform sensilla present (Fig. 100); foretarsi without an apical claw; at least the base of antennal segment III as pale as or paler than the rest 54
- 54 Head not produced in front of eyes (Fig. 74); metanotal sculpture slightly reticulate medially, median setae shorter than outer pair (Fig. 93); abdomen pale, yellow *austellus*
 – Head elongate, slightly produced in front of eyes (Fig. 81); metanotal sculpture striate, median setae longer than outer pair (Fig. 100); abdominal segments brown; [forewings often not fully developed] *phormiicola*
- 55 Pronotum usually with 3 pairs of posteromarginal

- setae, sometimes fewer (Figs 72–76); metanotal sculpture more or less striate (Figs 91, 92, 96); [abdominal sternites with 3 pairs of posteromarginal setae; ocellar setae III situated outside ocellar triangle (Figs 70, 73, 75); posteromarginal comb on tergite VIII usually present medially (Figs 86, 88, 89); antennae 7- or 8-segmented] 56
- Pronotum with 4 or 5 pairs of posteromarginal setae (Figs 71, 77, 79); metanotal sculpture reticulate or with at least some reticulations medially (Figs 94, 98, 102); [abdominal sternites usually with more than 3 pairs of posteromarginal setae (Fig. 82); ocellar setae situated inside or outside ocellar triangle (Figs 77, 79); posteromarginal comb on tergite VIII absent medially (Fig. 87); antennae 7-segmented] 63
- 56 Posteromarginal comb on tergite VIII complete, microtrichia long, fine and regular (Figs 84, 89) 57
- Posteromarginal comb on tergite VIII absent (Fig. 85), complete but irregular, microtrichia often on broad bases (Figs 86, 88), or with only a few microtrichia medially 61
- 57 Sternites with 15–20 discal setae; head and thoracic setae short and broad (Figs 75, 97); abdominal tergite X about twice as long as IX (Fig. 84); [distinctively bicoloured species; pleurotergites with 4–6 discal setae] *facetus* sp.n.
- Sternites with 7–15 discal setae; head and thoracic setae finer; abdominal tergite IX subequal to X 58
- 58 Antennae 7-segmented; [pleurotergites with 2 discal setae] 59
- Antennae 8-segmented; [pleurotergites with 2–4 discal setae] 60
- 59 Forewing dark; postocular setae II & III small (Fig. 73); brown species *evulgo* sp.n.
- Forewing pale; postocular setae III well-developed; bicoloured species *cedri*
- 60 Forewing pale or shaded; pleurotergites with 3–4 discal setae *vulgatissimus*
- Forewing dark; pleurotergites with 2–3 discal setae *meridionalis*
- 61 Yellow species; sternites with about 20 long discal setae almost reaching posterior margin (Fig. 83); antennae 7-segmented *apicatus*
- Brown species; sternites with fewer, shorter discal setae about 0.5 times length of segment; antennae 8-segmented 62
- 62 Forewing dark, first vein with 4+8–10 basal and 2–3 distal setae; pleurotergites with 1–3 discal setae; posteromarginal comb on tergite VIII of irregularly spaced microtrichia on broad bases (Fig. 86); median metanotal setae at anterior margin (Fig. 99); all postocular setae in a row (Fig. 78) *novocaledonensis*
- Forewing pale, first vein with 4+5–7 basal and 2–3 distal setae; pleurotergites with 3–4 discal setae; posteromarginal comb on tergite VII of short, irregular microtrichia, almost lobed or absent medially (Fig. 85); metanotum with median setae behind anterior margin (Fig. 91); head long with a pair of small postocular setae situated far behind row (Fig. 72) *alliorum*
- 63 Ocellar setae III situated inside ocellar triangle (Fig. 79); sternites with 6 pairs of posteromarginal setae (Fig. 82); pronotum with 5 pairs of posteromarginal and numerous additional discal setae (Fig. 79) *subnudula*
- Ocellar setae III situated outside or near anterior margins of ocellar triangle (Fig. 77); sternites with 3–4 pairs of posteromarginal setae; pronotum with 4 or 5 pairs of posteromarginal and the normal number of discal setae *imagnis*
- 64 Posteromarginal comb on tergite VIII incomplete or absent (Fig. 145) 65
- Posteromarginal comb on tergite VIII complete (Figs 144, 146–149) 71
- 65 Outer pronotal posteroangular seta much smaller than inner, little longer than discal setae (Fig. 129); [sternites often with more than 6 posteromarginal setae] *unispinus*
- Both pairs of pronotal posteroangular setae subequal, equal to or twice as long as discal setae (Figs 113–119, 122–126); [sternites with only 6 posteromarginal setae] 66
- 66 Metanotal sculpture closely striate (Figs 91, 134); [antennae 8-segmented; ocellar setae III situated outside ocellar triangle (Figs 123, 128)] 67
- Metanotal sculpture reticulate (Fig. 136) 70
- 67 Median metanotal setae situated behind anterior margin (Fig. 91); postocular setae II small and situated well behind row; ocellar setae III well developed (fig. 72); [pleurotergites with 0–3 discal setae] *alliorum*
- Median metanotal setae situated at anterior margin (Fig. 134); all postocular setae in a row; ocellar setae III smaller (Figs 123, 128); [pleurotergites without discal setae] 68
- 68 Forewing dark with base pale, first vein with a complete row of setae; postocular setae I long (Fig. 123); [body setae very dark; large brown species about 2 mm long] *gardeniae* sp.n.
- Forewing completely dark, first vein with 7–14 basal and 3–8 distal setae; postocular setae all subequal and small (Fig. 128) 69
- 69 Forewing first vein with 7 basal and 3–8 distal setae; smaller species, about 1.25 mm long; [brown] *vitticornis*
- Forewing first vein with 7 basal and 3 distal setae; larger species, about 1.5 mm long; [brown] *kotoshoi*
- 70 Median metanotal setae situated well behind anterior margin; forewing first vein with 7 basal and 4 distal setae; pronotum with distinct, transverse stri-

- ations; abdominal segments IX & X and ovipositor not particularly long; antennae 7-segmented [n.sp. Reyes, in press]
- Median metanotal setae situated at anterior margin; forewing first vein with a complete row of setae; pronotum almost without striations (Fig. 118); abdominal segments IX & X particularly long and narrow (Fig. 152); antennae 8-segmented *longicaudatus*
 - Median metanotal setae situated at anterior margin; forewing first vein with 7 basal and 3 distal setae; pronotum with distinct transverse striations (Fig. 116); abdominal segments IX & X shorter but ovipositor apparently extending beyond tip of X; antennae 7- or 8-segmented *leeuweni*
- 71 Ocellar setae III situated inside ocellar triangle (Fig. 122) (variable in *longiceps*) 72
- Ocellar setae III situated outside ocellar triangle (Figs 112–118, 120, 121, 124–127 74
- 72 Antennae 7-segmented; outer pronotal posteroangular setae much shorter than inner; [forewing first vein with 3 distal setae; metanotal campaniform sensilla absent] *emulatus*
- Antennae 8-segmented; pronotal posteroangular setae similar in length 73
- 73 Forewing first vein with 3 distal setae; metanotal sculpture broadly striate, campaniform sensilla present; postocular seta II displaced posteriorly behind I & III *longiceps*
- Forewing first vein with 4–7 distal setae; metanotal sculpture of elongate reticulations with internal wrinkles, campaniform sensilla absent (Fig. 139); postocular seta II in line with I & III (Fig. 122) *simplex*
- 74 Forewing first vein without a long gap in setae, 10–16 basal and 2–3 distal setae, sometimes almost a complete row; [metanotal sculpture striate] .. 75
- Forewing first vein with a long gap in setae, usually 7, rarely 8–9 basal and 2–4 distal setae; [metanotal sculpture sometimes reticulate medially] 79
- 75 Antennae 8-segmented, segments IV & V brown 76
- Antennae usually 7-segmented, if 8-segmented then antennal segments IV & V pale in basal half ... 77
- 76 Forewing with an almost complete row of first vein setae; metanotum very closely striate; larger species, about 2 mm long *fulmeki*
- Forewing with a gap in row of first vein setae; metanotum less closely striate; smaller species, about 1 mm long *samoensis*
- 77 Antennal segments IV & V bicoloured, basal half pale; [tergite VIII posteromarginal comb of short and irregular microtrichia; antennae 7- or 8-segmented] *wedeliae*
- Antennal segments IV–VII brown, IV & V rarely pale at extreme base; [antennae 7-segmented] . 78
- 78 Posteromarginal comb on tergite VIII of fine and regular microtrichia (Fig. 144); head setae small (Fig. 114); abdominal sternites with about 8 discal setae *cinchonae*
- Posteromarginal comb on tergite VIII of short and irregular microtrichia (Fig. 148); postocular setae I and ocellar setae III well developed (Fig. 124); abdominal sternites with 8–16, usually more than 11, discal setae *sumatrensis*
- 79 Median metanotal setae situated behind anterior margin; [antennae 7-segmented] 80
- Median metanotal setae situated at or near anterior margin, if situated behind anterior margin then antennae usually 8-segmented; [antennae 7- or 8-segmented] 83
- 80 Forewings banded; [median metanotal setae situated well behind anterior margin] *arorai*
- Forewings not banded, unicolorous or with base paler; [median metanotal setae situated sometimes nearer to anterior margin] 81
- 81 Forewings with base pale; [usually pale or darker yellow-brown species with at least darker brown antennal segments VII, VI, apical half of V & IV, abdominal tergite X, usually IX and sometimes a small, median patch on tergites V–VIII dark, sometimes entirely brown but always darkest medially; postocular setae I well developed; forewing first vein with 7 basal and 3 distal setae; posteromarginal comb on tergite VIII complete and of long, fine irregular microtrichia on broad bases; median metanotal setae situated usually behind or near anterior margin, sometimes on the margin; abdominal sternites with 12–20 discal setae] *coloratus*
- Forewings entirely brown; [brown species; antennal segments III & IV brown with base pale; abdominal tergites always concolorous; forewing first vein with 7 basal and 3–4 distal setae; metanotal sculpture striate] 82
- 82 Postocular setae I small; abdominal sternites with 8–9 discal setae; antennal segments V & VI entirely brown *griseus*
- Postocular setae I well developed; abdominal sternites with 15–18 discal setae; antennal segments V & VI with base pale *hispidus*
- 83 Antennae completely brown; [median metanotal setae situated sometimes behind anterior margin; antennae 8-segmented] 84
- Antennal segment III pale, yellow 85
- 84 Postocular seta II long and displaced posteriorly behind I & III; from India *longiceps*
- Postocular setae II shorter than I & III and not displaced posteriorly; from Java (Fig. 125) *tristis*
- 85 Median metanotal setae closer together than to lateral pair (Figs 132, 138); [antennae 8-segmented; metanotal sculpture striate; abdominal sternites with about 10 discal setae] 86
- Median metanotal setae closer to lateral pair than to each other; [antennae 7- or 8-segmented; metan-

- otal sculpture sometimes reticulate medially; abdominal sternites with 6–25 discal setae] 87
- 86 Antennal segment III distinctly paler than II & IV; median metanotal setae adjacent (Fig. 132); pronotum with distinct striations *brevistylus*
- Antennal segment III little paler than II & IV; median metanotal setae further apart (Fig. 138); pronotal striations indistinct; [antennal segment VI unusually long] *pavettae*
- 87 Pronotal posteroangular setae short (Figs 117, 119a), equal to or shorter than median metanotal setae; [antennae 7-segmented, segments IV & V and sometimes VI, with base pale; comb on tergite VIII robust and sometimes irregular (Fig. 146); abdominal sternites with 12–14 discal setae; often on *Melastoma* spp.] *melastomae*
- Pronotal posteroangular setae equal to, or longer than median metanotal setae; [antennae 7- or 8-segmented, segments IV & V often brown] 88
- 88 Postocular setae all small (Fig. 112); [cuticular surface of head and pronotum smooth; comb on tergite VIII of long, fine, regular microtrichia; forewings with base pale; metanotal sculpture striate (Fig. 130); antennae 8-segmented; abdominal sternites with 10–12 discal setae] *andrewsi*
- Postocular setae I well developed, usually much larger than II 89
- 89 forewings pale or dark but without base distinctly paler; [median postocular setae large, subequal to ocellar setae III (Fig. 113); tergal sculpture reaching median pores and setae; antennae 7-segmented] 90
- Forewings with base pale; [antennae 7- or 8-segmented] 91
- 90 Brown, tergites always concolorous; antennae dark except segment III; abdominal sternites with about 10 discal setae *aleuritidis*
- Usually bicoloured (see couplet 81), tergites darkest medially; at least antennal segments I–III paler than IV–VII; abdominal sternites with 12–20 discal setae *coloratus* in part
- 91 Bicoloured, head and thorax orange-yellow, abdomen brown; [metanotal sculpture broadly striate medially (Fig. 135)] *hawaiiensis* in part
- Brown; [metanotal sculpture often more closely striate] 92
- 92 Postocular setae II minute, much smaller than I or III (Fig. 121); [antennae usually 7-segmented; abdominal sternites with 6–14 discal setae] *florum*
- Postocular setae II subequal to III (Figs 120, 126); [antennae 7- or 8-segmented; abdominal sternites with 12–25 discal setae] 93
- 93 Antennae usually 7-segmented; ocellar setae III and postocular setae I much enlarged (Fig. 126); metanotal sculpture with a few ill-formed reticulations medially with internal wrinkles (Fig. 142) *unonae*
- Antennae usually 8-segmented; ocellar setae III and postocular setae I smaller (Fig. 120); metanotal sculpture without internal wrinkles (Fig. 135) *hawaiiensis* in part

KEY TO ORIENTAL AND PACIFIC THRIPS SPECIES MALES

N.B. Males are unknown for the following species: Group I, *beta*, *insignis*, *pallisetis*; Group II, *atactus*, *cerneo*, *conocephali*, *dorax*, *formosanus*, *garuda*, *himalayanus*, *rapaensis*, *rostratus*, *taurus*; Group IV, *austellus*, *cedri*, *evulgo*, *facetus*; Group V, *arorai*, *cinchonae*, *fulmeki*, *griseus*, *hispidus*, *kotoshoi*, *leeuweni*, *longicaudatus*, n.sp. Reyes, in press, *samoensis*, *unonae*, *wedeliae*.

- 1 Abdominal sternite VIII without discal setae, III to VII sometimes with 1 or 2 pairs; III to VII each with a glandular area (Fig. 56, cf. Figs 150, 151) (III to V in *tabaci* and *flavidulus*; III to VI in *carthami*; fragmented in *xenos*); [median metanotal setae situated behind anterior margin (at margin in *seticollis* and some *parvispinus*) (Groups I, II & III) 2
- Abdominal sternites III to VIII with discal setae; III to VII each with a glandular area (V to VII in *coprosmae*) (Groups IV & V) 39
- 2 All sternites without discal setae (Groups I, II & III in part) 3
- At least sternite III with at least 1 pair of discal setae (Group III) 33
- 3 Metanotal sculpture reticulate (cf. Figs 4–8, 66–68) (Groups I & III in part) 4
- Metanotal sculpture striate, sometimes with a few reticulations medially (cf. Figs 24–37) (Group II) 12
- 4 Forewing first vein with a complete or almost complete row of setae (cf. Fig. 10) 5
- Forewing first vein usually with 7 or 8 basal and 3 (2 to 6) distal setae (cf. Fig. 45) 9
- 5 Antennae 8-segmented (cf. Fig. 143); [yellow; ocellar setae III situated outside ocellar triangle (cf. Fig. 12); metanotal campaniform sensilla present (Fig. 6); tergite VIII posteromarginal comb complete but sparse] *bianchii*
- Antennae 7-segmented (cf. Fig. 42) 6
- 6 Tergite IX b1 setae closer together than to b2 setae (cf. Fig. 111); metanotal campaniform sensilla present; [pale brown; comb absent or of a few microtrichia laterally] *malloti*
- Tergite IX b1 setae closer to b2 than to each other (cf. Fig. 69); campaniform sensilla absent 7
- 7 Metanotal sculpture of elongate reticulations (Fig. 7); [ocellar setae III situated within ocellar

- triangle; [yellow *javanicus*, brown *morindae*] *javanicus*
- Metanotal sculpture polygonally reticulate (Fig. 8) 8
- 8 Ocellar setae situated within ocellar triangle (Fig. 59) *decens* sp.n.
- Ocellar setae situated outside ocellar triangle (Fig. 61) *orientalis*
- 9 Metanotal sculpture of poorly formed reticulations; forewing first vein with 4 to 6 distal setae; ocellar setae III situated outside ocellar triangle (Fig. 2); [sternal glandular areas large and oval (cf. Fig. 151); tergite VIII comb absent; tergite IX b1 and b2 setae equidistant] *alius* sp.n.
- Metanotal sculpture polygonally reticulate (Figs 8, 67); forewing first vein with 2 to 3 distal setae; ocellar setae III situated within or on the margins of ocellar triangle; [sternal glandular areas usually narrow transverse] 10
- 10 Forewing banded; [tergite VIII comb complete but sparse; ocellar setae III situated on margin of ocellar triangle] *latis*
- Forewing dusky or dark, base sometimes paler, not banded; [ocellar setae III situated within ocellar triangle (Figs 13, 60)] 11
- 11 Tergite VIII comb complete but irregular; tergite IX b1 and b2 setae equidistant *reticulatus*
- Tergite VIII comb absent; tergite IX b1 setae closer to b2 than to each other *extensicornis*
- 12 Glandular area absent on sternite VII 13
- Glandular area present on each of sternites III to VII 15
- 13 Glandular area present on each of sternites III to VI; metanotal campaniform sensilla present; [antennae 7-segmented; forewing first vein with 3 distal setae; ocellar setae III situated outside ocellar triangle] *carthami*
- Glandular area present on each of sternites III to V; metanotal campaniform sensilla absent; [tergite VIII comb complete] 14
- 14 Antennae 8-segmented; ocellar setae III situated within ocellar triangle; forewing first vein with 3 distal setae; tergite IX with 2 pairs of campaniform sensilla; [yellow] *flavidulus*
- Antennae 7-segmented; ocellar setae III situated on margins of ocellar triangle (cf. Fig. 41); forewing first vein with 4 (3 to 6) distal setae; tergite IX with 1 pair of campaniform sensilla (cf. Fig. 55); [yellow or pale brown] *tabaci*
- 15 Forelegs with a pretarsal claw (cf. Fig. 108); [uniformly pale brown; ocellar setae III small, situated within ocellar triangle; postocular setae I & III very long, II small; sternal glandular areas small, almost circular (Fig. 56)] *seticollis*
- Forelegs without pretarsal claw 16
- 16 Forewing first vein with a more or less complete row of setae; [pale with brown head; tergite IX b1 setae longer than b2 (cf. Fig. 69); ocellar setae III situated outside or on the margin of ocellar triangle] 17
- Forewing first vein with 7 or 8 basal and 2 to 7 distal setae, always with a distinct gap in setae row ... 18
- 17 Metanotal campaniform sensilla present (Figs 32, 33); sternal glandular areas small transverse; tergite VIII comb complete but irregular *rhabdotus*
- Metanotal campaniform sensilla absent (Fig. 28); sternal glandular areas oval; tergite VIII comb complete but sparse *modicus*
- 18 Sternites III to VII each with the glandular area divided into 5 to 8 small irregular patches; [yellow; antennae 7-segmented; ocellar setae III situated on margin of ocellar triangle; metanotal campaniform sensilla absent; forewing first vein with 3 distal setae; pleurotergites with 0 to 3 discal setae (cf. Fig. 107); tergite VIII comb complete but irregular] *xenos*
- Sternites III to VII each with 1 entire oval or transverse glandular area 19
- 19 Forewing first vein with 4 to 7 distal setae; metanotal campaniform sensilla absent (Fig. 31); tergite VIII comb absent 20
- Forewing first vein with 2 to 4 distal setae; metanotal campaniform sensilla usually present (Figs 24–27); tergite VIII comb usually present 21
- 20 Yellow; ocellar setae III situated within ocellar triangle *levatus*
- Brown; ocellar setae III situated on margin of ocellar triangle (Fig. 16) *pectiniprivus*
- 21 Antennae 8-segmented 22
- Antennae 7-segmented 23
- 22 Forewing first vein usually with 4 distal setae; antennae brown except segment III *tectus*
- Forewing first vein usually with 3 distal setae; antennal segments I to base IV & V yellow *flavus* in part
- 23 Ocellar setae III situated within ocellar triangle 24
- Ocellar setae III situated outside or on margin of ocellar triangle 26
- 24 Metanotal sculpture with a few reticulations medially; [tergite VIII comb absent] *tanicus*
- Metanotal sculpture completely striate; [yellow] 25
- 25 Tergite IX b1 setae shorter than b2; [b1 much closer to b2 than to each other; tergite VIII comb complete but short and irregular (Fig. 57); sternal glandular areas large and transverse] *flavus* in part
- Tergite IX b1 setae equal in length to b2 *kodaicanalensis*
- 26 Tergite VIII comb absent or with a few small microtrichia; [metanotal campaniform sensilla present] 27

- Tergite VIII comb complete but sometimes short and irregular 28
- 27 Yellow *alatus*
– Brown *obscuripes*
- 28 Metanotal campaniform sensilla absent; [yellow with some brown markings; tergite VIII comb complete and long (cf. Fig. 58); sometimes micropterous or brachypterous] *nigropilosus*
– Metanotal campaniform sensilla present; [always macropterous] 29
- 29 Tergite IX b1 setae much closer to b2 than to each other; [brown; sternal glandular areas small and oval; tergite VIII comb well developed; pleurotergites with 0 to 3 discal setae] *brunneus*
– Tergite IX b1 and b2 setae more or less equidistant 30
- 30 Tergite IX b1 setae longer than b2; [yellow; forewing first vein with 2 distal setae; sternal glandular areas large and transverse] *pallidulus*
– Tergite IX b1 setae equal to or shorter than b2 . 31
- 31 Sternal glandular areas broad and transverse; [pleurotergites with 0 to 3 discal setae; tergite VIII comb short and irregular] *setosus*
– Sternal glandular areas small or narrow 32
- 32 Sternal glandular areas narrow and transverse; metanotal sculpture converging posteriorly (Fig. 30); [very pale yellow; forewing first vein with 2 or 3 distal setae; tergite VIII comb long (Fig. 58)] *palmi*
– Sternal glandular areas small, oval; metanotal sculpture not converging posteriorly ... *fuscicornis*
- 33 Antennae 8-segmented; metanotal sculpture striate; [tergite VIII comb short, sparse and irregular; tergite IX b1 setae equal to or shorter than b2] *setipennis*
– Antennae 7-segmented; metanotal sculpture reticulate (Figs 66–68) 34
- 34 Forewing first vein with 2 or 3 distal setae *extensicornis*
– Forewing first vein with a complete or almost complete row of setae 35
- 35 Tergite IX b1 setae closer to b2 than to each other; [brown] 36
– Tergite IX b1 and b2 setae equidistant or b1 closer together 37
- 36 Ocellar setae III situated within ocellar triangle (Fig. 59) *decens* sp.n.
– Ocellar setae III situated outside or on margin of ocellar triangle (Fig. 61) *orientalis*
- 37 Tergite IX b1 setae closer together than to b2; [pale yellowish brown; forewing first vein not always with a complete row of setae; sternal glandular areas large] *compressicornis*
– Tergite IX b1 and b2 setae more or less equidistant 38
- 38 Brown; tergite VIII comb absent; ocellar setae III situated on margin of ocellar triangle (Fig. 62); median metanotal setae situated at or near anterior margin *parvispinus*
– Yellowish brown; tergite VIII comb usually present but very sparse; ocellar setae III situated outside ocellar triangle; median metanotal setae situated far behind anterior margin *taiwanus*
- 39 Most pleurotergites with at least 1 discal seta (Figs 106, 107) (Group IV) 40
– All pleurotergites without discal setae (Group V) 51
- 40 Micropterous or brachypterous; [head longer than broad (Figs 72, 81); ocellar setae situated outside ocellar triangle] 41
– Macropterous 42
- 41 Antennae 8-segmented; metanotal campaniform sensilla absent, median setae situated far behind anterior margin (Fig. 91); tergite IX b1 setae situated anterior to b2 and subequal in length; [pleurotergites with 0 to 6 discal setae] ... *alliorum* in part
– Antennae 7-segmented; metanotal campaniform sensilla present, median setae situated behind anterior margin (Fig. 100); tergite IX b1 setae in a line with b2 and much longer; [pleurotergites with 2 or 3 discal setae] *phormiicola*
- 42 Sternite III and sometimes also IV without a glandular area; [brown; antennae 7-segmented; forewing first vein with a complete row of setae; metanotal campaniform sensilla absent (Fig. 95); tergite VIII comb complete but irregular; tergite IX b1 setae longer than b2 and much closer to b2 than to each other; sternal glandular areas small and circular] *coprosmae*
– Sternites III to VII each with a glandular area . 43
- 43 Forewing first vein with a complete row of setae 44
– forewing first vein with 7 to 10 basal and 3 or 4 distal setae 46
- 44 Metanotal sculpture reticulate, median setae situated far behind anterior margin (Fig. 94); ocellar setae III situated on margin of ocellar triangle (Fig. 71); tergite IX b1 setae equal to or longer than b2; [antennae 7-segmented; sternal discal setae numerous; glandular areas transverse] ... *australis*
– Metanotal sculpture striate, sometimes with a few reticulations medially, median setae situated at or near anterior margin; ocellar setae III situated outside ocellar triangle; tergite IX b1 setae much longer than b2 45
- 45 Sternal glandular areas oval; head not longer than broad (Fig. 80); [pale brown; antennae 7- or 8-segmented; metanotal sculpture closely striate; pleurotergites usually with more than 3 discal setae] *obscuratus*
– Sternal glandular areas narrow, transverse; head longer than broad (Fig. 81); [pale brown; antennae 7-segmented; metanotal sculpture with a few reticu-

- lations medially (Fig. 100); pleurotergites with 2 or 3 discal setae] *phormiicola*
- 46 Antennae 7-segmented; usually yellow; [median metanotal setae situated far behind anterior margin (Figs 92, 98, 102)] 47
- Antennae 8-segmented; mostly brown; [ocellar setae III situated outside ocellar triangle (Figs 70, 78); metanotal sculpture striate (Figs 92, 99)] .. 48
- 47 Ocellar setae III situated outside ocellar triangle (Fig. 70); metanotal sculpture striate (Fig. 92); pleurotergites with 2 to 6 discal setae; tergite VIII comb absent; tergite IX b1 setae longer than b2 *apicatus*
- Ocellar setae III situated on margin of ocellar triangle (Fig. 77); metanotal sculpture reticulate (Fig. 98); pleurotergites with 1 to 3 discal setae; tergite VIII comb sparse or absent; tergite IX b1 setae shorter than b2 and closer to b2 than to each other (Fig. 110) *imiginis*
- Ocellar setae III situated within ocellar triangle (Fig. 79); metanotal sculpture of elongate reticulations (Fig. 102); pleurotergites with 4 or 5 discal setae; tergite VIII comb sparse or absent; tergite IX b1 setae subequal to b2 and closer together than to b2 (Fig. 111) *subnudula*
- 48 Metanotal campaniform sensilla absent (Fig. 91); head longer than broad (Fig. 72); [median metanotal setae situated far behind anterior margin; sternal glandular areas large and transverse; pleurotergites with 0 to 6 discal setae; tergite VIII comb absent or with a few microtrichia laterally; tergite IX b1 setae situated anterior to b2 and subequal in length (cf. Fig. 109)] *alliorum* in part
- Metanotal campaniform sensilla present; head not longer than broad (Fig. 78) 49
- 49 Median metanotal setae situated at anterior margin (Fig. 99); sternal glandular areas narrow and transverse; forewing first vein with 9 or 10 distal setae; tergite IX b1 and b2 setae more or less in a line; [pleurotergites with 0 to 3 discal setae; tergite VIII comb complete but irregular; tergite IX b1 setae longer than b2] *novocaledonensis*
- Median metanotal setae situated behind anterior margin; sternal glandular areas oval; forewing first vein with 7 basal setae; tergite IX b1 setae situated anterior to b2 (Fig. 109) 50
- 50 Tergite VIII comb absent; [pleurotergites with 1 to 4 discal setae] *vulgatissimus*
- Tergite VIII comb present but short, sparse and irregular; [pleurotergites with 2 or 3 discal setae] *meridionalis*
- 51 Forewing first vein with a more or less complete row of setae; [ocellar setae III situated outside ocellar triangle; metanotal sculpture striate] Group IV (part) & V 52
- Forewing first vein with at most 7 to 12 basal and 2 to 8 distal setae, always with a distinct gap 54
- 52 Antennae 7-segmented; tergite VIII comb complete but short; sternal glandular areas narrow and transverse; [yellow] *sumatrensis*
- Antennae 8-segmented; tergite VIII comb absent; sternal glandular areas large and transverse 53
- 53 Pale brown; tergite IX b1 setae slightly longer than b2 *samoensis*
- Yellow; tergite IX b1 setae much longer than b2; [median metanotal setae situated sometimes slightly behind anterior margin (Fig. 134)] *gardeniae* sp.n.
- 54 Pronotum with 5 or 6 pairs of posteromarginal setae; [antennae 7-segmented; ocellar setae III situated within or on margin of ocellar triangle; median metanotal setae situated far behind anterior margin; [yellow; pronotum with 1 pair (inner) of long posteroangular setae; metanotal campaniform sensilla absent; tergite VIII comb complete but irregular] *emulatus*
- Pronotum with 4 pairs of posteromarginal setae or fewer 55
- 55 Pronotum with 1 pair of long posteroangular setae (Fig. 129); [yellow; antennae 7-segmented; ocellar setae III situated within ocellar triangle; metanotal sculpture at least partly reticulate (Fig. 131) *unispinus*
- Pronotum with 2 pairs of long posteroangular setae 56
- 56 Metanotal sculpture distinctly reticulate, campaniform sensilla absent (Fig. 139); [brown; antennae 8-segmented; ocellar setae III situated within ocellar triangle (Fig. 122); median metanotal setae situated far behind anterior margin; forewing first vein with 4 to 7 distal setae; tergite VIII comb short, sparse and irregular; tergite IX b1 setae situated anterior to b2 (cf. Fig. 109); sternal glandular areas large and transverse (Fig. 151)] *simplex*
- Metanotal sculpture striate 57
- 57 Head longer than broad (Fig. 72); metanotal campaniform sensilla absent, median setae situated far behind anterior margin (Fig. 91); [brown; antennae 8-segmented; ocellar setae III situated outside ocellar triangle; tergite VIII comb absent or with a few microtrichia laterally; tergite IX b1 setae situated anterior to b2; sternal glandular areas large and transverse] *alliorum* in part
- Head not longer than broad; metanotal campaniform sensilla present; median metanotal setae situated at or near anterior margin (except *longiceps*) 58
- 58 Antennae 7-segmented; [mostly yellow; sternal glandular areas narrow] 59
- Antennae 8-segmented; [mostly brown; sternal glandular areas circular or broad] 63
- 59 Tergite IX b1 and b2 setae more or less equidistant 60
- Tergite IX b1 setae closer to b2 than to each other 61

- 60 Body setae longer, inner pronotal posteroangular setae 0.4 times the median length of the pronotum (Fig. 119b) *hawaiiensis* in part
 – Body setae shorter, inner pronotal posteroangular setae 0.3 times the median length of the pronotum (Fig. 119a) *melastomae*
- 61 Brown *florum* in part
 – Yellow 62
- 62 Forewing first vein with 3 or 4 distal setae; median metanotal setae situated always at anterior margin *aleuritidis*
 – Forewing first vein always with 3 distal setae; median metanotal setae situated sometimes slightly behind anterior margin *coloratus*
- 63 Postocular setae II (sub-median) long and displaced posteriorly behind I and III; sternal glandular areas circular; [brown; ocellar setae III situated on margin of ocellar triangle; median metanotal setae situated far behind anterior margin; tergite IX b1 and b2 setae long and close together] *longiceps*
 – Postocular setae all in a line; sternal glandular areas oval, narrow or broad and transverse 64
- 64 Median metanotal setae situated closer together than to lateral setae and situated at or near anterior margin 65
 – Median metanotal setae situated closer to lateral setae than to each other 66
- 65 Median metanotal setae almost adjacent (Fig. 132) *brevistylus*
 – Median metanotal setae further apart (Fig. 138) *pavettae*
- 66 Forewing first vein with 9 or 10 basal setae; tergite vIII comb complete but irregular *novocaledonensis*
 – Forewing first vein with 7 basal setae; tergite VIII comb absent 67
- 67 Sternal glandular areas oval; [median metanotal setae situated at or near anterior margin (Fig. 141); tergite IX b1 setae twice as long as b2] *tristis*
 – Sternal glandular areas narrow or broad and transverse; [median metanotal setae situated always at anterior margin] 68
- 68 Tergite IX b1 setae almost twice as long as b2 *andrewsi*
 – Tergite IX b1 setae equal to or slightly longer than b2 69
- 69 Sternal glandular areas broad; [brown; forewing first vein with 3 to 8 distal setae; metanotal sculpture closely striate (cf. *gardeniae*, Fig. 134); tergite IX b1 setae more or less equal to b2 and slightly closer to b2 than to each other] *vitticornis*
 – Sternal glandular areas narrow; [paler brown; forewing first vein with 3 distal setae] 70
- 70 Metanotal sculpture broadly striate (Fig. 135); tergite IX b1 and b2 more or less equidistant *hawaiiensis* in part

- Metanotal sculpture more closely striate; tergite IX b1 setae closer to b2 than to each other *florum* in part

SPECIES DESCRIPTIONS

Group I

All the species in group I lack sternal and pleurotergal discal setae, and the metanotal sculpture is distinctly reticulate, but they share some characteristics with *orientalis*, *decens* and *extensicornis* in group III (Table 1). It is a small group of nine species found only in the Oriental and Pacific Regions; two are described here as new, but none is particularly common. These nine fall into three main groups. *T. insignis* and *bianchii*, both from New Caledonia, have 8-segmented antennae and 3 pairs of posteromarginal setae on sternite II, a characteristic shared only by four New Zealand species in group IV; all the others have 7-segmented antennae and 2 pairs of posteromarginal setae on sternite II. *T. pallisetis*, *javanicus* and *alius* have distinctively elongate reticulate metanotal sculpture. All the other species have polygonally reticulate sculpture. *T. alius*, however, has probably the most variable sculpture of all the species considered here, sometimes appearing similar to the *malloti*, *reticulatus* and *beta* group and to *conocephali* in group II. The affinities of the remaining species, *latis*, are unclear as it shares characteristics with *insignis*, *malloti* and *reticulatus*.

Thrips alius sp.n.

(Figs 1, 2, 4, 91)

♀ macroptera. Colour uniformly brown; legs pale with darker mid- and hind-femora; antennal segment III pale, IV & V pale with darker apices, VI pale at base; forewings with base pale; body setae dark.

Antennae 7-segmented; ocellar setae III situated outside ocellar triangle; postocular setae I & III well developed, II minute. Pronotum distinctly striate with 3 pairs of posteromarginal setae (Fig. 2). Metanotal campaniform sensilla absent; median setae less than half median length of metanotum and situated far behind anterior margin; sculpture arcuate in anterior half and of poorly formed reticulations arranged almost in a whorl or converging posteriorly, reticulations with internal wrinkles (fig. 4). Forewing first vein with 4+3 basal and 4(3–6) distal setae; scale with 5 setae, apical seta longer than subapical.

Table 1 Character state distribution of Oriental and Pacific *Thrips* species

A	metanotal sculpture reticulate	+							
	striate	-							
B	pleurotergal discal setae present	+							
	absent	-							
C	sternite V discal setae present	+							
	absent	-							
D	sternite VII discal setae present	+							
	absent	-							
E	tergite VIII posteromarginal comb absent								
F	tergite VIII posteromarginal comb present laterally only								
G	tergite VIII posteromargin comb complete and irregular								
H	tergite VIII posteromarginal comb complete and regular								
I	number of antennal segments								
(* = species belonging to another group)									
SPECIES	A	B	C	D	E	F	G	H	I
Group I									
<i>alius</i>	+/-	-	-	-	+	+			7
<i>beta</i>	+	-	-	-	+	+			7
<i>bianchii</i>	+	-	-	-			+		8
<i>insignis</i>	+	-	-	-				+	8
<i>javanicus</i>	+	-	-	-		+			7
<i>latis</i>	+	-	-	-				+	7
<i>malloti</i>	+	-	-	-	+	+			7
<i>pallisetis</i>	+	-	-	-	+	+			7
<i>reticulatus</i>	+	-	-	-			+	+	7
* <i>orientalis</i>	+	-	+/-	-		+			7
* <i>extensicornis</i>	+	-	+/-	-		+			7
* <i>decens</i>	+	-	+/-	-		+			7
Group II									
<i>alatus</i>	-	-	-	-				+	7
<i>atactus</i>	+/-	-	-	-				+	7
<i>beharensis</i>	-	-	-	-				+	7
<i>brunnea</i>	-	+/-	-	-				+	7
<i>carthami</i>	-	-	-	-				+	7
<i>cerno</i>	-	-	-	-	+	+			8
<i>conocephali</i>	+/-	-	-	-		+			7
<i>dorax</i>	-	-	-	-			+		7
<i>flavidulus</i>	-	-	-	-				+	8
<i>flavus</i>	-	-	-	-				+	7/8
<i>formosanus</i>	-	-	-	-				+	7
<i>fuscicornis</i>	-	-	-	-			+	+	7
<i>garudus</i>	+/-	-	-	-				+	7
<i>himalayanus</i>	-	-	-	-				+	8
<i>kodaikanalensis</i>	-	-	-	-			+	+	7
<i>levatus</i>	+/-	-	-	-		+			7
<i>modicus</i>	-	-	-	-			+	+	7
<i>nigropilosus</i>	-	-	-	-				+	7
<i>obscuripes</i>	-	-	-	-				+	7
<i>pallidulus</i>	+/-	-	-	-				+	7
<i>palmi</i>	-	-	-	-				+	7
<i>pectiniprivus</i>	-	-	-	-		+			7
<i>rapaensis</i>	-	-	-	-			+		7
<i>rhabdotus</i>	-	-	-	-				+	7
<i>rostratus</i>	-	-	-	-				+	7
<i>seticollis</i>	-	-	-	-		+		+	8
<i>setosus</i>	-	+/-	-	-			+	+	7
<i>tabaci</i>	+/-	-	-	-				+	7

Table 1 Cont.

SPECIES	A	B	C	D	E	F	G	H	I
<i>tanicus</i>	+/-	-	-	-				+	7
<i>taurus</i>	+/-	-	-	-				+	7
<i>tectus</i>	-	-	-	-				+	8
<i>xenos</i>	-	+/-	-	-				+	7
Group III									
<i>decens</i>	+	-	+/-	-		+			7
<i>compressicornis</i>	+	-	+	-	+				7
<i>extensicornis</i>	+	-	+/-	-		+			7
<i>orientalis</i>	+	-	+/-	-		+			7
<i>parvispinus</i>	+	-	+	-	+	+			7
<i>setipennis</i>	-	-	+	-				+	8
<i>taiwanus</i>	+	-	+	-	+	+	+		7
Group IV									
<i>alliorum</i>	-	+/-	+	+			+		8
<i>apicatus</i>	-	+	+	+			+		7
<i>austellus</i>	+/-	+	+	+			+	+	7
<i>australis</i>	+	+	+	+		+			7
<i>cedri</i>	+/-	+	+	+				+	7
<i>coprosmae</i>	+/-	+	+	+			+		7
<i>evulgo</i>	-	+	+	+				+	7
<i>faceus</i>	-	+	+	+				+	7
<i>imagineis</i>	+/-	+	+	+			+		7
<i>meridionalis</i>	-	+	+	+				+	8
<i>novocaledonensis</i>	-	+/-	+	+			+		8
<i>obscuratus</i>	-	+	+	+				+	7/8
<i>phormiicola</i>	+/-	+	+	+			+	+	7
<i>subnudula</i>	+/-	+	+	+			+		7
<i>vulgatissimus</i>	-	+	+	+				+	8
* <i>unispinus</i>	+	-	+	+		+			7
Group V									
<i>aleurites</i>	-	-	+	+			+	+	7
<i>andrewsi</i>	+/-	-	+	+				+	8
<i>arorai</i>	+/-	-	+	+				+	7
<i>brevistylus</i>	-	-	+	+			+	+	8
<i>cinchonae</i>	-	-	+	+				+	7
<i>coloratus</i>	+/-	-	+	+			+		7
<i>emulatus</i>	+/-	-	+	+			+	+	7
<i>florum</i>	+/-	-	+	+			+		7/8
<i>fulmeki</i>	-	-	+	+			+	+	8
<i>gardeniae</i>	-	-	+	+			+		8
<i>griseus</i>	-	-	+	+				+	7
<i>hawaiiensis</i>	+/-	-	+	+			+	+	7/8
<i>hispidus</i>	-	-	+	+				+	7
<i>kotoshoi</i>	-	-	+	+			+		8
<i>longicaudatus</i>	+	-	+	+			+	+	8
<i>longiceps</i>	-	-	+	+				+	8
<i>leeuweni</i>	+	-	+	+			+	+	7/8
<i>melastomae</i>	-	-	+	+				+	7
<i>n.sp. Reyes</i>	+	-	+	+			+		7
<i>pavettae</i>	-	-	+	+				+	8
<i>simplex</i>	+	-	+	+			+	+	8
<i>samoensis</i>	-	-	+	+			+	+	8
<i>sumatrensis</i>	-	-	+	+			+	+	7
<i>tristis</i>	-	-	+	+				+	8
<i>unispinus</i>	+	-	+	+			+		7
<i>unonae</i>	+/-	-	+	+				+	7
<i>vitticornis</i>	-	-	+	+			+		8
<i>wedeliae</i>	-	-	+	+				+	7/8
* <i>alliorum</i>	-	+/-	+	+			+		8
* <i>novocaledonensis</i>	+/-	+	+	+			+		8

Abdominal sternites without discal setae, with 3 pairs of posteromarginal setae (II with 2 pairs), VII with median setae anterior to posterior margin (Fig. 9a). Pleurotergites without discal setae. Tergite II with 3 lateral setae, the 4th seta situated on anterior corner of pleurotergite. Tergite VIII posteromarginal comb absent or represented by only a few small microtrichia laterally.

Measurements (♀ Holotype in μm). Body length 1500. Ocellar setae III 25. Postocular setae I 20; II 4; III 12. Pronotal posteroangular setae, inner 62/68; outer 60. Median metanotal setae 36/38.

♂ macroptera. Colour very pale yellow-brown with darker brown apices of antennal segments IV & V, apical two-thirds of VI and all of VII.

Structure similar to female. Tergite VIII comb absent, IX b1 setae a little longer than b2, their bases equidistant. Sternites III–VII each with a large oval glandular area.

Measurements (♂ paratype in μm). Body length 1240. Ocellar setae III 30. Postocular setae I 22; II 4; III 12. Pronotal posteroangular setae, inner 60/62; outer 60/65. Median metanotal setae 24/30. Sternite V glandular area median length 12; breadth 82. Tergite IX b1 setae length 26/28, distance between bases 8; b2 setae length 20/23, distance between bases 38.

COMMENTS. This species is morphologically most similar to *javanicus*, from Java and Malaya, which usually differs in the position of ocellar setae III and in metanotal sculpture. However *alius* is remarkably variable in both these characteristics and may be confused with the *mallotti* group from Malaysia and New Guinea, and with *conocephali* and *pectiniprivus* in group II from Java.

BIOLOGY. Possibly associated with bananas.

DISTRIBUTION. Philippines.

MATERIAL EXAMINED. Holotype ♀ PHILIPPINES: Tadeo, Davao Norte, alt. 30 m, on banana leaf, 9.ix.1977 (*E.S. Raros*) (BMNH). Paratypes. 7♀, 1♂, same data as holotype. CHINA: Yunnan, on banana, 1♀ Menlue, 11.iv.1987, 1 Xishuangbanna, 18.iv.1987 (*Zhang Wei-qi*) (ZWG).

Thrips beta sp.n.

(Figs 3, 5, 9b)

♀ macroptera. Colour uniformly brown; tibiae and tarsi pale; antennal segment III, most of IV

& V pale; forewings dusky with base slightly paler.

Antennae 7-segmented; ocellar setae III situated inside but near anterior margins of ocellar triangle; postocular setae I & III well developed, II minute. Pronotum weakly striate with 3 pairs of posteromarginal setae (Fig. 3). Metanotal campaniform sensilla present; median setae short and situated well behind anterior margin; sculpture of small, ill-formed reticulations with internal markings (Fig. 5). Forewing first vein with 4+3 basal and 3 distal setae; scale with 5 setae, apical seta longer than subapical. Abdominal sternites without discal setae, with 3 pairs of posteromarginal setae (II with 2 pairs); VII with median setae on posterior margin (Fig. 9b). Pleurotergites without discal setae. Tergite II with 3 lateral marginal setae, the 4th seta situated on margin of pleurotergite. Tergite VIII posteromarginal comb absent or represented by only a few small microtrichia laterally.

Measurements (♀ Holotype in μm). Body length 1378. Ocellar setae III 32. Postocular setae I 20; II 6; III 23. Pronotal posteromarginal setae, inner 76; outer 46/52. Median metanotal setae 26/36.

♂ Unknown.

COMMENTS. This species is most similar to *reticulatus*, which differs in having longer median metanotal setae and a complete comb on tergite VIII.

BIOLOGY. Unknown.

DISTRIBUTION. New Guinea.

MATERIAL EXAMINED. Holotype ♀. PAPUA NEW GUINEA: 1 mile from Tambul to Mt Aagen, on grass verge, 13.vii.1976 (*A. Ward*) (BNMH).

Paratypes. 2 ♀, same data as holotype.

Thrips bianchii (Sakimura)

(Figs 6, 10, 12)

Taeniothrips (*Isochaetothrips*) *bianchii* Sakimura, 1969: 77–79. Holotype ♀, NEW CALEDONIA (BPBM) [examined].

Thrips bianchii (Sakimura): Bhatti, 1978: 191.

♀ Medium to large; uniformly brown with antennal segment III, tibiae and base of forewing paler.

Antennae 8-segmented; ocellar setae III situated outside ocellar triangle; postocular setae I well developed (Fig. 12). Forewing first vein with a complete row of setae (Fig. 10); scale with 5 setae, apical seta shorter than subapical. Meta-

notum campaniform sensilla present; reticulate sculpture, slightly elongate posteriorly; median setae situated behind anterior margin (Fig. 6). Tergite II with 4 lateral setae; VIII posteromarginal comb of short and very fine microtrichia. Abdominal sternites and pleurotergites without discal setae. Sternite II with 3 pairs of postero-marginal setae.

♂ Yellow; sternites III–VII each with a large transverse glandular area; tergite VIII comb with a few microtrichia medially; IX with b1 setae longer than b2 and closer to b2 than to each other.

COMMENTS. This species is structurally most similar to *insignis*, which differs in being yellow and in having a much better developed comb, and to *mallotti*, which has 7-segmented antennae and more polygonally reticulate metanotal sculpture. Specimens from the New Hebrides are identical to *bianchii* except that they appear bicoloured with orange head and thorax and brown abdomen.

BIOLOGY. In flowers of *Croton*, *Acacia*, *Melaleuca* and *Cerbera*.

DISTRIBUTION. New Caledonia.

MATERIAL EXAMINED. NEW CALEDONIA: Holotype ♀, 1 ♂ paratype (BPBM), 2 ♀ paratypes (Saki).

DOUBTFULLY ASSOCIATED MATERIAL. NEW HEBRIDES: 5 ♀ (SMF), 6 ♀ (BMNH).

Thrips insignis (Bianchi)

Isochaetothrips insignis Bianchi, 1945: 274. Holotype ♀. NEW CALEDONIA (BPBM) [examined].

Taeniothrips insignis (Bianchi): Sakimura, 1967c: 724.

Thrips insignis (Bianchi): Bhatti, 1978: 191.

♀ Medium to large; uniformly orange-yellow, antennal segment I paler than II–VIII.

Antennae 8-segmented; ocellar setae III situated on margin of ocellar triangle, near base of first ocellus. Pronotal posteroangular setae short, about 0.25 of median length of pronotum. Metanotum with median setae short and situated well behind anterior margin; sculpture reticulate; campaniform sensilla not apparent. Forewing first vein with a complete row of setae; scale apparently with 4 setae, apical seta longer than subapical. Sternites and pleurotergites without discal setae. Sternite II with 3 pairs of postero-marginal setae. Tergite II with 3 lateral setae;

tergite VIII comb complete, microtrichia long, fine and regularly spaced.

♂ Unknown.

COMMENTS. *T. insignis* and *latis* are the only completely pale species in the *mallotti* group. *T. bianchii* is structurally most similar but this species is brown and has a very poorly developed comb on tergite VIII. The Indian species *latis* differs mainly in having 7-segmented antennae, forewings with 2 narrow dark bands and only 2 distal first vein setae.

BIOLOGY. Unknown.

DISTRIBUTION. New Caledonia.

MATERIAL EXAMINED. NEW CALEDONIA: Holotype ♀ (BPBM).

Thrips javanicus Priesner

(Figs 7, 11)

Thrips javanicus Priesner, 1934: 272–273. Holotype ♀, JAVA (SMF) [examined]

Thrips morindae Priesner, 1934: 275–276. Syn-type ♀, JAVA, Edam 1. (SMF) [labelled as lectotype by Bhatti, 1978] [examined]. **Syn.n.**

♀ Small to medium, brown species; legs dark; wings dark with base pale; antennae dark with segment III pale.

Antennae 7-segmented; ocellar setae III situated within ocellar triangle (cf. *extensicornis* Fig. 60). Metanotum with distinctively elongate reticulations with internal wrinkles; median setae situated behind anterior margin; campaniform sensilla absent (Fig. 7). Forewing first vein with an almost complete row of setae (4+3–5 + 2–4+2) (Fig. 11); scale with 5 setae, apical seta longer than subapical. Sternites and pleurotergites without discal setae. Tergite II with 3 lateral setae; tergite VIII posteromarginal comb represented by only a few microtrichia laterally.

♂ Pale, orange yellow with pale wings; sternites III–VII each with a narrow transverse glandular area; tergite VIII comb indiscernable; IX b1 and b2 setae almost equal in length, b1 closer to b2 than to each other.

COMMENTS. The ♀ holotype and ♂ paratype of *morindae* are mounted laterally and some characteristics are therefore difficult to examine. Apart from a slight difference in the arrangement of forewing first vein setae and lengths of pronotal posteroangular setae the holotype is identical to *javanicus*. The ♂ paratype of *morindae* is much darker than *javanicus*, the pronotum appears to have more numerous discal setae and

tergite IX b1 and b2 setae are shorter and slightly further apart. However, as specimens other than type material of both species are unknown, this variation is impossible to assess and so the two are here synonymized. There are now an additional 2 ♀ known.

T. javanicus is most similar morphologically to *pallisetis*, from Australia, which has completely pale wings, evenly spaced first vein setae and median metanotal setae on anterior margin; and *alius*, from the Philippines, which has ocellar setae III usually outside the ocellar triangle, although variable in position, and metanotal sculpture usually more striate although also variable.

BIOLOGY. *T. javanicus* is recorded from flowers of *Corymbis* and *morindae* from *Morinda*.

DISTRIBUTION. Java, Malaya.

MATERIAL EXAMINED. JAVA: Holotype ♀, 1 paratype ♂ of *javanicus*; 'Lectotype' ♀, 1 'paralectotype' ♂ of *morindae* (SMF); 1 ♀ (BMNH). MALAYA: 1 ♀ (BMNH).

Thrips latis Bhatti

Thrips latis Bhatti, 1967: 17–18. Lectotype ♀, INDIA (JSB) [designated by Bhatti, 1980: 141] [not examined].

Thrips ignobilis Ananthakrishnan & Jagadish, 1969: 116–117. Syntypes ♀, INDIA (TNA) [Synonymised by Bhatti & Ananthakrishnan, 1978] [not examined].

DESCRIPTION. Bhatti, 1980: 141–143 [& illustrations].

COMMENTS. A yellow species most similar to *insignis*.

BIOLOGY. Unknown.

DISTRIBUTION. India.

MATERIAL EXAMINED. None.

Thrips mallotti Priesner

Thrips (Isoneurothrips) mallotti Priesner, 1934: 269–270. Holotype ♀, JAVA (SMF) [examined].

Thrips (Isoneurothrips) addendus Priesner, 1934: 270–271. Holotype ♀, TAIWAN [FORMOSA] (SMF) (Synonymised by zur Strassen 1978: 191) [examined].

♀ Medium; pale to dark brown species, pale legs, forewings dark with base pale.

Antennae 7-segmented; ocellar setae situated

near margins of ocellar triangle. Metanotal campaniform sensilla present; sculpture polygonally reticulate; median setae situated behind anterior margin. Forewing first vein with a complete row of setae; scale with 5 setae, apical seta longer than subapical. Sternites and pleurotergites without discal setae. Tergite II with 3 lateral marginal setae, 4 displaced onto pleurotergite; tergite VIII posteromarginal comb absent or represented by only a few small microtrichia laterally.

♂ Paler brown; sternites III–VII each with a narrow transverse glandular area; tergite VIII comb with a few small microtrichia laterally; tergite IX b1 setae longer than b2, and closer together than to b2.

COMMENTS. *T. mallotti* looks most similar to *orientalis* and *extensicornis* (Figs 60–61, 67–68) but these species are probably not closely related. They usually have at least 1 pair of sternal discal setae and uniformly dark wings and *extensicornis* has a long gap in the row of first vein setae.

BIOLOGY. Found in flowers of *Lantana*, *Mallostus* and *Beaumontia*.

DISTRIBUTION. Sumatra, Java, Malaya, New Guinea, Queensland, Bali, Celebes, Solomon Is, Philippines, Okinawa, Caroline, Palau, Taiwan, India.

MATERIAL EXAMINED. JAVA: Holotype ♀ of *mallotti* (SMF); 8 ♀, 1 ♂ (BMNH). TAIWAN: Holotype ♀, 3 ♂ paratypes of *addendus* (SMF). BALI: 1 ♀ (SO). CELEBES: 1 ♀ (SO). MALAYA: 2 ♀, 2 ♂ (BMNH).

Thrips pallisetis Sakimura

Thrips (Isothrips) pallisetis Sakimura, 1969: 71–74. Holotype ♀, AUSTRALIA (CAS) [examined].

♀ Large; brown, antennal segments II & III and forewings pale.

Antennae 7-segmented; ocellar setae III situated outside ocellar triangle. Metanotum with distinctively elongate reticulate sculpture; campaniform sensilla present; median setae situated at anterior margin. Forewing first vein with complete row of setae; scale with 5 setae, apical seta longer than subapical. Sternites and pleurotergites without discal setae. Tergite II with 4 lateral marginal setae; tergite VIII posteromarginal comb absent or represented by only a few small microtrichia.

♂ Unknown.

COMMENTS. Close relatives of *T. pallisetis* are

not obvious. It looks most similar to *javanicus* but this species has dark forewings and an irregular row of first vein setae. *T. malloti* is also similar but differs mainly in having polygonally reticulate metanotal sculpture and ocellar setae III situated inside the ocellar triangle.

BIOLOGY. Unknown.

DISTRIBUTION. Australia: NSW.

MATERIAL EXAMINED. AUSTRALIA: NSW., Holotype ♀ (CAS).

Thrips reticulatus Moulton

(Figs 8, 13)

Thrips reticulatus Moulton, 1940: 254–255. Holotype ♀, NEW GUINEA (BPBM) [not examined].

♀ Medium to large; brown, legs yellow, antennal segments III–VI pale at base, forewings slightly paler at base.

Antennae 7-segmented; ocellar setae III situated inside ocellar triangle (Fig. 13). Metanotum with polygonally reticulate sculpture; campaniform sensilla absent; median setae long and situated behind anterior margin (Fig. 8). Forewings with 7 basal and 3 distal first vein setae; scale with 5 setae, apical seta shorter than subapical. Sternites and pleurotergites without discal setae. Tergite II with 3 lateral setae; tergite VIII with a complete comb of microtrichia although sometimes irregular (cf. Fig. 144).

♂ Paler, yellow with long, dark pronotal posteroangular setae; sternites III–VII each with a narrow transverse glandular area; tergite VIII comb complete but short and irregular; tergite IX b1 setae longer than b2, their bases equidistant.

COMMENTS. *T. reticulatus* is morphologically similar to *malloti*, which has a complete row of forewing first vein setae and ocellar setae III situated on outer margins of ocellar triangle, and *extensicornis*, which usually has a pair of sternal discal setae and comb absent medially. *T. beta* from New Guinea is also similar but this species has small metanotal median setae and comb absent medially.

BIOLOGY. Unknown.

DISTRIBUTION. New Guinea.

MATERIAL EXAMINED. NEW GUINEA: 2 ♀, 2 ♂ paratypes (CAS).

Group II

Species in group II do not have any sternal discal setae and, apart from three species, they also lack pleurotergal discs. They differ from species in group I in having mostly striate metanotal sculpture. The group comprises 32 species in the Oriental and Pacific Regions, 15 of which have not been found previously outside the Indian subcontinent and one from Fiji described as new. It includes four of the most significant pest species in the genus; *nigropilosus*, *palmi*, *setosus* and *tabaci*. *Thrips palmi*, *setosus* and *tabaci* are also vectors of tomato spotted wilt virus (TSWV). Apart from *setosus*, these pest species appear to form a closely related group of yellow to pale brown species with the microtrichia of the posteromarginal comb on tergite VIII long, fine and regularly spaced. This group also includes the pale Indian species *flavidulus*, *kodaikanalensis*, *taurus*, *alatus* and *pallidulus* and the bicoloured Indian species *carthami*, *atactus* and *garuda*. *T. dorax* is also similar but has a more irregular tergal comb. Other species with such a well developed comb are brown. These include *himalayanus*, *tanicus* and *tectus* from India, *formosanus* from Taiwan, *obscuripes* and *rostratus* both from Java, and *setosus* and *brunneus*, both from Japan. These last two species are unusual in having at least 1 discal seta on most pleurotergites, as does the Indian species *xenos* which may be closely related to them. It is a yellow species, however, and the males are unique in the genus in having numerous, small sternal glandular areas. *T. seticollis* from Australia and *ceruo* from Fiji are unusual in this group in having the median metanotal setae situated at the anterior margin. The remaining species fall into two groups; *T. modicus*, *rhabdotus* and *rapaensis* from South Pacific islands all have a complete row of forewing first vein setae, and *conocephali* and *pectiniprivus* from Java and Krakatau have only 3–5 distal first vein setae. In many ways these last two species are very similar to *alius* from the Philippines in group I. The yellow, Indian species *levatus* also belongs to this group although its relationships are unclear.

Thrips alatus Bhatti

Thrips alatus Bhatti, 1980: 118–120. Holotype ♀, INDIA (JSB) [not examined].

DESCRIPTION. Bhatti, 1980: 118–120.

COMMENTS. Yellow species very similar to *palmi*, indeed Bhatti considers it to be the Himalayan counterpart of *palmi*.

BIOLOGY. Unknown.

DISTRIBUTION. India, Nepal.

MATERIAL EXAMINED. NEPAL: 5 ♀, 2 ♂ (BMNH).

Thrips atactus Bhatti

Thrips atactus Bhatti, 1967: 17. Holotype ♀, INDIA (ZSI) [not examined].

DESCRIPTION. Bhatti, 1980: 126–127.

COMMENTS. Distinctively bicoloured species, structurally most similar to *garuda* and *nigropilosus*.

BIOLOGY. Unknown.

DISTRIBUTION. India, known only from the holotype.

MATERIAL EXAMINED. None.

Thrips beharensis (Ramakrishna & Margabandhu)

Oxyrrhinothrips beharensis Ramakrishna & Margabandhu, 1939: 29–30. Syntypes ♀, INDIA (ZSI) [not examined].

Thrips (Oxyrrhinothrips) beharensis (Ramakrishna & Margabandhu), Shumsher, 1942: 130–131 (in part—Shumsher considered it a synonym of *rostratus* Priesner).

Thrips beharensis (Ramakrishna & Margabandhu), Bhatti, 1980: 127.

DESCRIPTION. Ramakrishna & Margabandhu, 1939: 29–30. Male described by Ananthakrishnan, 1953: 199.

COMMENTS. Small, pale yellow species closely related to *palmi*, *alatus* and *pallidulus*. Described, originally in *Oxyrrhinothrips*, as having a long, pointed mouthcone. This characteristic is difficult to interpret as its appearance may be affected by the orientation of the head and the degree of telescoping of the head into the pronotum. The types were not illustrated and have not been available for study but the two females from the Murshidabad District of India (ZSI) labelled as *beharensis* are indistinguishable from *palmi*.

BIOLOGY. Unknown.

DISTRIBUTION. India.

MATERIAL EXAMINED. None.

Thrips brunneus Ishida

(Fig. 14)

Thrips physapus f. *brunnea* Ishida, 1936: 67–70.

Holotype ♀ KURILES (ICH) [examined].

Thrips brunneus Ishida, Kudô, 1979: 490.

♀ Medium to large; dark brown; forewings paler at base; antennal segment III slightly paler.

Antennae 7-segmented; ocellar setae III situated outside ocellar triangle near anterior margin (cf. Fig. 40). Metanotum with broadly striate sculpture; campaniform sensilla present; median setae situated far behind anterior margin (cf. Fig. 36). Forewings with 7 basal and 3 distal first vein setae; scale with 5 setae, apical seta longer than subapical. Sternites without discal setae. Pleurotergites with 1–3 discal setae. Tergite II with 3 lateral setae, 4th on pleurite; tergite VIII posteromarginal comb complete, with long, fine and regularly spaced microtrichia (cf. Fig. 53).

♂ Brown; well developed posteromarginal comb on tergite VIII; tergite IX b1 setae closer to b2 setae than to each other; sternites III–VII each with a small oval glandular area.

COMMENTS. *T. brunneus* is unusual in having pleurotergal discal setae but no sternal discs. From the species considered here it shares this characteristic only with *setosus*, also from Japan and with which it is closely related, and *xenos*, a yellow species from India. The females of *setosus* are much smaller and differ in having pale bases to antennal segments IV & V; pronotal discal setae more numerous (cf. Figs. 14, 40); the males are paler brown with tergite VIII comb shorter and tergite IX b1 and b2 setae equidistant. The males of *xenos* are unique in the genus in having numerous small glandular areas on sternites III–VII.

BIOLOGY. Unknown.

DISTRIBUTION. Known only from Japan.

MATERIAL EXAMINED. JAPAN: Kuriles, Holotype ♀; 1 ♀, 1 ♂ paratypes (ICH).

Thrips carthami Shumsher

Thrips carthami Shumsher, 1946: 184–185. Holotype ♀, INDIA (? IARI) [not examined].

DESCRIPTION. Bhatti, 1980: 128–129.

COMMENTS. Bicoloured species, larger but structurally similar and probably related to *palmi*.

BIOLOGY. Often found on Rosaceous trees such

as almond, peach and loquat (*Amygdalus* and *Eryobotrya* species).

DISTRIBUTION. India, Kashmir, Pakistan, Bhutan.

MATERIAL EXAMINED. INDIA: 5 ♀. PAKISTAN: 41 ♀. BHUTAN: 5 ♀ (BMNH).

Thrips cerno sp.n.

(Figs 21, 25)

♀ macroptera. Colour uniformly brown; tibiae and tarsi pale; antennal segment III and base of IV & V pale; forewings dusky, slightly paler at base.

Antennae 8-segmented; ocellar setae III exceptionally long and situated inside but near anterior margins of ocellar triangle; postocular setae I apparently absent, II minute, III well developed (Fig. 21). Pronotum without striations, with 3 pairs of posteromarginal setae, median pair, midlaterals and posteroangulars long (Fig. 21). Metanotal campaniform sensilla present; sculpture elongate, almost striate, median setae situated near anterior margin (Fig. 25). forewing first vein with a complete row of setae; scale with 5 setae, apical seta shorter than subapical. Abdominal sternites without discal setae, with 3 pairs of posteromarginal setae, sternite VII with median setae near posterior margin. Pleurotergites without discal setae. Tergite II with 3 lateral setae, 4th seta situated on pleurotergite. Tergite VIII posteromarginal comb absent or represented by only a few small microtrichia laterally.

Measurements (Holotype ♀ in µm). Body length 1220. Ocellar setae III 100/96. Postocular setae II 4; III 26/28. Pronotal posteroangular setae, inner 108; outer 116. Median metanotal setae 56/60.

♂ Unknown.

COMMENTS. Although known from only 2 specimens, this species is described here as new because it has exceptionally long interocellar setae more reminiscent of *Frankliniella* and *Taeniothrips* species. It is otherwise an unremarkable species, similar in most respects to the Australian *Thrips seticollis* but differing in the length of ocellar setae III, absence of a complete posteromarginal comb of long microtrichia on tergite VIII, pale tibiae and bicoloured antennal segments IV & V.

BIOLOGY. Taken from gladiolus flowers.

DISTRIBUTION. Fiji.

MATERIAL EXAMINED. Holotype ♀. FIJI: Viti Levu, Naduruloulou, in gladiolus flowers, 27.xi.1951 (B.A. O'Connor) (BMNH). Paratype. 1 ♀, same data as holotype.

Thrips conocephali Priesner

(Fig. 17)

Thrips conocephali Priesner, 1934: 274–275. Syn-type ♀, JAVA (SMF) [labelled as lectotype by Bhatti, 1978] [examined].

♀ Medium; brown, dark forewings with pale base, antennal segment III slightly paler.

Antennae 7-segmented, ocellar setae III situated near anterior margins of ocellar triangle (Fig. 17). Pronotum with numerous discal setae (Fig. 17). Metanotum with striate sculpture sometimes with a few ill-formed reticulations medially; campaniform sensilla present; median setae situated behind anterior margin (cf. Fig. 133). Forewing first vein with 7 basal and 4 or 5 distal setae; scale with 5 setae, apical seta longer than subapical. Abdominal sternites and pleurotergites without discal setae. Tergite II with 3 lateral setae; tergite VIII posteromarginal comb absent medially (cf. Fig. 52).

♂ Unknown.

COMMENTS. *T. conocephali* is morphologically similar to *alius* (group I), from banana leaves in the Philippines, which also sometimes has a few reticulations medially on the metanotum but the antennae of *alius* are paler. However, *conocephali* is most closely related to *pectiniprivus*, which differs in having bicoloured antennal segments III & IV, fewer pronotal discals, no campaniform sensilla and median metanotal setae situated further behind anterior margin. Although the position of ocellar setae III is difficult to assess, those of *conocephali* appear to be situated on the outer margins of the ocellar triangle, slightly further apart than in *pectiniprivus*.

BIOLOGY. Known only from flowers of *Conocephalus*.

DISTRIBUTION. Java.

MATERIAL EXAMINED. JAVA: 'Lectotype' ♀, 1 ♀ 'paralectotype' (SMF).

Thrips dorax Bhatti

Thrips dorax Bhatti, 1980: Holotype ♀, INDIA (JSB) [not examined].

DESCRIPTION. Bhatti, 1980: 132.

COMMENTS. Bicoloured species which Bhatti

suggests is related to *garuda*. It is unusual in this group, however, in having a complete but irregular posteromarginal comb on tergite VIII.

BIOLOGY. Unknown.

DISTRIBUTION. India, known only from the holotype.

MATERIAL EXAMINED. None.

Thrips flavidulus (Bagnall)

Physothrips flavidulus Bagnall, 1923: 628. Lectotype ♀ INDIA (BMNH) [designated by Mound, 1968: 56] [examined].

Thrips flavidulus (Bagnall) Bhatti, 1980: 132–133.

DESCRIPTION. Bhatti, 1980: 132–133.

COMMENTS. Large, pale yellow species morphologically very similar to *flavus*. They may be found in mixed populations, and the two species are not always distinguishable (Bhatti, 1980).

BIOLOGY. Unknown.

DISTRIBUTION. India, Nepal.

MATERIAL EXAMINED. INDIA: Lectotype ♀, 1 ♀ paratype, 1 ♀ (BMNH).

DOUBTFULLY ASSOCIATED MATERIAL. INDIA: 1 ♂. NEPAL: 1 ♀. CHINA: 1 ♂ (BMNH).

Thrips flavus Schrank

(Figs 19, 26, 46, 48, 57)

Thrips flava Schrank, 1776: 31–33. Syntypes ♀, AUSTRIA (depository unknown).

Physothrips flavidus Bagnall, 1916b: 399–400. Holotype ♀, JAPAN (BMNH). [Synonymised by Bhatti, 1970] [examined].

Taeniothrips clarus Moulton, 1928b: 287–289. Holotype ♂, TAIWAN (CAS) [examined].
Syn.n.

Taeniothrips saussureae Ishida, 1936: 70–72. Holotype ♀ (ICH), [Synonymised by Kudô, 1979: 491]. [examined].

Full synonymy in Bhatti, 1980: 133–135.

♀ Large; pale, brownish yellow, antennal segments IV to VIII brown or IV & V often bicoloured.

Antennae 7- or 8-segmented; ocellar setae small, situated close together, well within ocellar triangle (Fig. 19). Metanotum with striate sculpture; campaniform sensilla present; median setae situated well behind anterior margin (Fig. 26). Forewing first vein with 7 basal and 3 distal setae;

scale with 5 setae, apical seta longer than subapical. Sternites and pleurotergites without discal setae. Tergite II with 4 lateral marginal setae; tergite VIII posteromarginal comb complete, of long, fine, regularly spaced microtrichia.

♂ Similar to ♀ but much smaller; sternites III to VII each with a large transverse glandular area; tergite VIII with a complete but very short and irregular posteromarginal comb (Fig. 57); tergite IX b1 setae shorter than b2 and closer to b2 than to each other.

COMMENTS. *T. flavus* is a very variable species and this variation is discussed by Bhatti (1980).

Moulton (1928b) described *Taeniothrips clarus* with 8-segmented antennae, and five pages later *Thrips clarus* which differed in being smaller, having fewer wing setae and 7-segmented antennae. The holotype and 2 ♀ paratypes of *saussureae* have 8-segmented antennae. The variation known to exist within *flavus* encompasses all these nominal species, and *Thrips clarus* was synonymised with *flavus* by Gentile & Bailey (1968). However, although one of the ♂ paratypes may be *flavus*, all the females have ocellar setae III situated outside or on the margins of the ocellar triangle and must, therefore, be *palmi*.

Apart from size, *flavus* is morphologically very similar to *palmi*, and these belong to a group of related, pale species from India.

BIOLOGY. Common and polyphagous.

DISTRIBUTION. Widespread from Pakistan to Korea: Nepal, Pakistan, N. India, Thailand, Taiwan, China, Korea, Japan, Malaya, Philippine Islands, Australia; also known from North America, Europe and Africa.

MATERIAL EXAMINED. TAIWAN: Holotype ♂, 1 ♀ paratype, 3 ♀ of *Taeniothrips clarus* (CAS). JAPAN: Holotype, 2 ♀ paratypes of *Taeniothrips saussureae* (Ishida Collection); lectotype ♀, 2 ♀ paralectotypes of *T. flavidus*; holotype ♀ of *P. flavidus* (BMNH). (*Thrips clarus* see *palmi*). Also about 350 ♀, ♂, Europe, Japan, China, Nepal, Pakistan, India, Malaya, Australia (BMNH), 21 ♀, ♂, Taiwan, Nepal, Japan (SO).

Thrips formosanus Priesner

(Figs 22, 27)

Thrips formosanus Priesner, 1934: 283–284.

Holotype ♀, TAIWAN (SMF) [examined].

♀ Medium uniformly brown, forewings dusky, legs dark, antennae dark, segment III paler at base.

Antennae 7-segmented; ocellar setae III situated outside ocellar triangle (Fig. 22). Metanotum with striate sculpture; campaniform sensilla present; median setae situated far behind anterior margin (Fig. 27). Forewing first vein with 7 basal and 3 distal setae: scale with 5 setae, apical seta longer than subapical. Sternites and pleurotergites without discal setae. Tergite II with 4 lateral setae; tergite VIII with a complete, regular posteromarginal comb (cf. Fig. 51).

♂ Unknown.

COMMENTS. *T. formosanus* is very closely related to *obscuripes* and *rostratus*. Both these species, however, have antennal segment III dark, and *rostratus* has no metanotal campaniform sensilla. *T. tanicus* known only from India, however, may be most closely related. *T. tabaci* with ocellar setae III inside the ocellar triangle, and the yellow species *palmi*, *alatus* and *pallidulus* are also structurally similar.

BIOLOGY. Unknown.

DISTRIBUTION. India, Taiwan.

MATERIAL EXAMINED. TAIWAN: Holotype ♀ (SMF).

DOUBTFULLY ASSOCIATED MATERIAL. NEPAL: 7 ♀. JAPAN: 6 ♀ (SO).

Thrips fuscicornis Ishida

Thrips fuscicornis Ishida, 1936: 72–74. Holotype ♂, KURILES, JAPAN (ICH) [examined].

♀ Unknown.

♂ Pale. Antennae 7-segmented; ocellar setae III situated outside ocellar triangle. Metanotal campaniform sensilla present; sculpture striate; median setae situated far behind anterior margin. Forewings with 7 basal and 3 distal setae; scale with 5 setae, apical seta longer than subapical. Sternites and pleurotergites without discal setae. Sternites III–VII each with a small, transverse, oval glandular area. Tergite II with 4 lateral setae; VII with microtrichia medially on posterior margin; tergite VIII comb complete. Tergite IX b1 and b2 setae equal in length and distance between bases.

COMMENTS. This species was collected with *T. saussureae* (= *flavus*) and *T. brunneus*. Kudô (1979) recognised that the ♂ holotype and 2 ♂ paratypes were not conspecific with the ♀ paratypes. These females are misidentified *flavus*. The males are not *flavus* as they differ in having ocellar setae III outside the ocellar triangle. They could be *palmi* but the sternal glandular areas are

a little small, tergite VIII comb is a little short and, as a few pleurotergites appear to have a single discal seta, they may be teneral *brunneus*. It is also possible, however, that they do belong to the *formosanus* species group which comprises: *tanicus* and possibly *himalayanus* from India and *formosanus* from Taiwan, males of which are unknown; *rostratus* from Java, Celebes and Bali, the holotype ♀ of which does not have a pair of metanotal campaniform sensilla; *obscuripes* from Java; and possibly *tectus* from India.

T. setosus is another similar species closely related to *brunneus* and also from Japan. Both these species, however, normally have at least 1 pleurotergal discal seta on most segments but it would not be surprising for males of either to be found without them. Males of many species tend to be smaller and have fewer, often shorter body setae than the females.

BIOLOGY. Unknown.

DISTRIBUTION. Japan.

MATERIAL EXAMINED. JAPAN: Holotype ♂, 1 ♂ paratype (ICH).

Thrips garuda Bhatti

Thrips garuda Bhatti, 1980: 137. Holotype ♀, INDIA (JSB) [not examined].

DESCRIPTION. Bhatti, 1980: 137.

COMMENTS. Bicoloured species morphologically similar to *atactus* and *dorax* both also from India.

BIOLOGY. Unknown.

DISTRIBUTION. India.

MATERIAL EXAMINED. None.

Thrips himalayanus (Pelikan)

Taeniothrips himalayanus Pelikan, 1970: 363–365. Holotype ♀, NEPAL (IZUI) [not examined].

Thrips himalayanus (Pelikan) Bhatti, 1978: 192–193.

DESCRIPTION. Bhatti, 1980: 140–141.

COMMENTS. Dark brown species very similar morphologically and probably related to *formosanus* and *tanicus*. Both these species, however, have 7-segmented antennae and median metanotal setae situated well behind the anterior margin.

BIOLOGY. Described from 22 ♀ from *Rhododendron* leaves.

DISTRIBUTION. Nepal.

MATERIAL EXAMINED. None.

***Thrips kodaikanalensis* Ananthakrishnan & Jagadish**

Thrips kodaikanalensis Ananthakrishnan & Jagadish, 1966: 89–91. Syntypes ♀, INDIA (TNA) [not examined].

Thrips exhuberans Ananthakrishnan & Jagadish, 1968: 360–361. Syntypes ♀ ♂, INDIA (TNA) [Synonymised by Bhatti 1970] [not examined].

DESCRIPTION. Ananthakrishnan & Jagadish, 1966: 89–91.

COMMENTS. Large, pale brown species, very similar morphologically and related to *flavus*.

BIOLOGY. Unknown.

DISTRIBUTION. India.

MATERIAL EXAMINED. INDIA: 8 ♀ paratypes of *kodaikanalensis* (BMNH).

***Thrips levatus* Bhatti**

Thrips levatus Bhatti, 1980: 143–144. Holotype ♀, INDIA (JSB) [not examined].

DESCRIPTION. Bhatti, 1980: 143–144.

COMMENTS. Yellow species with the postero-marginal comb of tergite VIII absent medially.

BIOLOGY. Unknown.

DISTRIBUTION. India, Thailand.

MATERIAL EXAMINED. INDIA: 1 ♀, 1 ♂ paratypes (BMNH)

DOUBTFULLY ASSOCIATED MATERIAL. THAILAND: 3 ♀ (BMNH). MALAYA: 2 ♀, 1 ♂ (SMF); 3 ♀ (BMNH). SINGAPORE: 3 ♀ (BMNH). BRUNEI: 2 ♀ (BMNH).

***Thrips modicus* Bianchi**

(Figs 23, 28)

Thrips (Isothrips) modicus Bianchi, 1953: 96–97. Holotype ♀, SAMOA (BPBM) [examined].

♀ Small to medium; uniformly mid-brown, forewings and femora dark, tibiae and antennal segment III pale.

Antennae 7-segmented; ocellar setae III very short, situated just outside ocellar triangle; postocular setae II minute, situated anterior to I

(Fig. 23). Pronotum with striations; posteroangular setae very short (Fig. 23). Metanotum closely striate; campaniform sensilla absent; median setae very short and situated far behind anterior margin (Fig. 28). Forewing first vein usually with an almost complete row of setae; scale with 5 setae, apical seta longer than subapical. Sternites and pleurotergites without discal setae. Tergite II with 3 lateral setae; tergite VIII posteromarginal comb complete but of short and irregular microtrichia.

♂ Pale with brown head. Sternites III–VII with oval glandular areas. Tergite VIII comb with microtrichia medially; tergite IX b1 setae longer than b2 and almost equidistant.

COMMENTS. This species is closely related to *rhabdotus* and *rapaensis* from Fiji, Tonga and Rapa I, but both these species have longer ocellar setae III, pronotal posteroangulars and median metanotals. *T. rapaensis* also lacks pronotal striations.

BIOLOGY. Unknown.

DISTRIBUTION. Samoa.

MATERIAL EXAMINED. SAMOA: Holotype ♀, 1 ♂ paratype (BPBM).

***Thrips nigropilosus* Uzel**

(Fig. 50)

Thrips nigropilosa Uzel, 1895: 198–199. Syntypes ♀, ♂. BOHEMIA (?NHM) [not examined].

♀ Medium; yellow with various brown markings.

Antennae 7-segmented; ocellar setae III situated outside ocellar triangle. Metanotum with sculpture varying with wing development, reticulate or striate with some reticulations medially; median setae situated far behind anterior margin; campaniform sensilla absent. Forewings, when fully developed, with 7–8 basal, 3 distal setae; scale with 5 setae, apical seta longer than subapical. Sternites and pleurotergites without discal setae. Tergite II with 3 lateral marginal setae (Fig. 50); tergite VIII posteromarginal comb complete, and of long, fine, regular microtrichia.

♂ Similar to ♀; sternites III–VII each with a transverse glandular area; tergite VIII comb with long microtrichia medially; tergite IX b setae shorter than b2, bases about equidistant.

COMMENTS. This species is most similar morphologically and related to the bicoloured Indian species *atactus* and *garuda*; to *palmi*, which is a uniformly very pale species; and to *tabaci* and

flavus, which both have ocellar setae III situated inside the ocellar triangle.

BIOLOGY. The Chrysanthemum thrips, a pest of cultivated *Pyrethrum* in East Africa and egg plant in Hawaii. Common particularly on lettuce, other Compositae and *Phaseolus* in Fiji and on Scotch thistle in New Zealand (Walker & Michaux, 1989), a glasshouse pest in Europe and the USA. Also known from *Plantago*, flax, wheat and onion.

DISTRIBUTION. It is widespread in northern temperate regions; Korea, Japan, Hawaii, Philippines, Fiji, Australia, New Zealand, North America, Europe, East Africa, Mauritius.

MATERIAL EXAMINED. About 60 ♀ from North America, Europe, East Africa, Australia and New Zealand (BMNH).

Thrips obscuripes Priesner

Thrips obscuripes Priesner, 1934: 278–279. Syntype ♀, JAVA (SMF) [labelled as lectotype by Bhatti, 1978] [examined].

♀ Medium to small; uniformly dark brown, legs, wings and antennae dark.

Antennae 7-segmented, ocellar setae III situated outside or near margins of ocellar triangle (cf. Fig. 38). Metanotum with striate sculpture; campaniform sensilla present; median setae situated well behind anterior margin (Fig. 29). Forewing first vein with 7 basal and 3 distal setae; scale with 5 setae, apical seta longer than subapical. Sternites and pleurotergites without discal setae. Tergite II with 4 lateral marginal setae; tergite VIII posteromarginal comb complete and regular (Fig. 51).

♂ similar to ♀; sternites III–VII each with a small, transverse, oval glandular area; tergite VIII posteromarginal comb not apparent; tergite IX b1 setae slightly shorter than b2 and slightly closer to b2 than to each other.

COMMENTS. This species is closely related to *tanicus* from India, *formosanus*, which has a pale antennal segment III, and *rostratus*, which does not have metanotal campaniform sensilla. The last 2 species also have ocellar setae III slightly further apart. *T. flavus* is also similar but is a pale species with ocellar setae much closer together.

BIOLOGY. Unknown.

DISTRIBUTION. Java.

MATERIAL EXAMINED. JAVA: Lectotype ♀; 3 ♀, 1 ♂ paralectotypes (SMF).

Thrips pallidulus Bagnall

Thrips pallidulus Bagnall, 1924: 424–425. Lectotype ♀, INDIA (BMNH) [designated by Mound, 1968] [examined].

DESCRIPTION. Bhatti, 1980: 151–152 [& illustrations].

COMMENTS. Pale yellow species most similar and closely related to *palmi* and *alatus*.

BIOLOGY. Unknown.

DISTRIBUTION. India.

MATERIAL EXAMINED. INDIA: Lectotype ♀; 3 ♀, 1 ♂ paralectotypes (BMNH).

DOUBTFULLY ASSOCIATED MATERIAL. CHINA: 1 ♂ (BMNH).

Thrips palmi Karny

(Figs 20, 30, 49, 58)

Thrips palmi Karny, 1925: 10–15. Lectotype ♀, SUMATRA. (SMF) [not examined].

Thrips clarus Moulton, 1928b: 294–295. Holotype ♀, TAIWAN (CAS) [Synonymised by Nakahara, 1990] [examined].

Thrips gossypicola Priesner, 1939: 41. INDIA (Nomen nudum) [Synonymised by Bhatti, 1980: 153].

Thrips gracilis Ananthakrishnan & Jagadish, 1968: 361. Syntypes ♀, ♂. INDIA (TNA) [Synonymised by Bhatti, 1970: 381] [not examined].

Chloethrips aureus Ananthakrishnan & Jagadish, 1967: 381. Syntypes ♀, ♂. INDIA (TNA) [Synonymised by Bhatti, 1970: 381] [not examined].

♀ Medium to small; uniformly very pale yellow, antennal segments IV & V bicoloured or dark, VI & VII dark.

Antennae 7-segmented; ocellar setae III situated outside ocellar triangle (Fig. 20). Metanotum with sculpture broadly striate, converging posteriorly; median setae situated far behind anterior margin; campaniform sensilla present (Fig. 30). Forewing first vein with 7 basal and 2–3 distal setae; scale with 5 setae, apical seta longer than subapical. Sternites and pleurotergites without discal setae. Tergite II with 4 lateral marginal setae (Fig. 49); tergite VIII posteromarginal comb complete and of long, fine, regularly spaced microtrichia.

♂ Similar to ♀; sternites III–VII each with a narrow, transverse glandular area; tergite VIII comb complete medially and of long, fine micro-

trichia (Fig. 58); tergite IX b1 setae slightly shorter than b2 and a little closer to b2 than to each other.

COMMENTS. *T. palmi* is very closely related to 2 Indian species *alatus* and *pallidulus* which differ slightly in metanotal sculpture and antennal colour. Other, morphologically similar, pale species are *tabaci* and *flavus* which have ocellar setae III situated close together within the ocellar triangle, and *nigropilosus*, which usually has some brown abdominal markings and is often brachypterous or micropterous. Variation and distribution of *palmi* are discussed by Bhatti (1980).

BIOLOGY. It has been known since the 1920's from Sumatra, Java and India where it was found particularly on tobacco and cotton, and in Taiwan on the composite flowers of *Chrysanthemum* and *Bidens* where it was known as *clarus* Moulton. Until 1980, when Bhatti made it possible to recognise *palmi*, it was found in the Orient from Pakistan to Thailand frequently on cucurbits but a number of specimens in 5 samples from Thailand, 1947, 1959, 1960 and 1962, were misidentified as *flavidulus* (= *flavus*) (BMNH). It has been recognised as *palmi* only during the last 10 years while it has spread rapidly throughout the Oriental and Pacific Regions and has become a serious pest (Sakimura *et al.*, 1986; Bournier, 1987). It causes most economic damage to cucurbits and is known to transmit tomato spotted wilt virus in water melons in Japan (Kameya-Iwaki *et al.*, 1988). It is now also suspected of transmitting TSWV to groundnuts in India (Palmer *et al.*, in press).

DISTRIBUTION. Common and widespread from Mauritius to Japan and New Caledonia. [Martinique, Guadeloupe, Dominica, St Kitts, Trinidad, Sudan, Mauritius, Reunion, Pakistan, India, Bangladesh, Thailand, Taiwan, China, Hong Kong, Japan, Korea, Hawaii, Philippine Is, Malaya, Singapore, Sumatra, Java, Guam, Brunei, Australian N.T., Wallis, New Caledonia, Samoa.]

MATERIAL EXAMINED. TAIWAN: Holotype ♀; 8 ♀, 2 ♂ paratypes of *Thrips clarus* (CAS). About 150 ♀, ♂ from St Kitts, Trinidad, Mauritius, Pakistan, India, Thailand, Taiwan, China, Japan, Korea, Hawaii, Philippines, Malaya, Singapore, Java, Brunei, Australian N.T., Samoa (BMNH). 20 ♀, 4 ♂ from Korea, Thailand, Taiwan (SO).

Thrips pectiniprivus Priesner

(Figs 16, 31, 52)

Thrips pectiniprivus Priesner, 1934: 273–274. Holotype ♀, KRAKATAU (SMF) [examined].

♀ Small to medium; uniformly brown, forewings dark with pale base, antennal segments IV & V with paler base.

Antennae 7-segmented; ocellar setae III situated near anterior margins of ocellar triangle (Fig. 16). Metanotum with broadly striate sculpture; median setae situated far behind anterior margin; campaniform sensilla absent (Fig. 31). Forewing first vein with 7 basal and 4–5 distal setae; scale with 5 setae, apical seta longer than subapical. Sternites and pleurotergites without discal setae. Tergite II with 4 lateral marginal setae; tergite VIII posteromarginal comb absent medially (Fig. 52).

♂ Similar to ♀, small, brown; legs pale; sternites III–VII each with a large, transverse glandular area; tergite VIII posteromarginal comb absent, tergite IX b1 and b2 setae equal in length, bases equidistant.

COMMENTS. This species is most closely related, and very similar, to *conocephali*, which has brown antennal segments IV & V, more numerous pronotal discal setae, median metanotal setae nearer the anterior margin and ocellar setae III slightly further apart on the outer margins of the ocellar triangle. *T. alius* (group II) is also similar but has more reticulate metanotal sculpture and ocellar setae III further apart.

BIOLOGY. In flowers of *Desmodium*.

DISTRIBUTION. Krakatau.

MATERIAL EXAMINED. KRAKATAU: Holotype ♀; 1 ♀, 1 ♂ paratype (SMF).

Thrips rapaensis Moulton

(Fig. 18)

Isoneurothrips rapaensis Moulton, 1939: 142–143. Holotype ♀, SOCIETY IS. (BPBM) [examined].

Thrips (Isothrips) rapaensis Moulton; Priesner, 1940: 54. ♀ Medium; uniformly brown, forewings dark with base very slightly paler, antennal segment III pale yellow-brown.

Antennae 7-segmented; ocellar setae III well developed and situated outside ocellar triangle; postocular setae I & III well developed subequal to ocellar setae III, II minute (Fig. 18). Pronotal

striations indistinct (Fig. 18). Metanotum with closely striate sculpture; median setae situated far behind anterior margin; campaniform sensilla present (cf. Fig. 33). Forewing first vein setae variable, usually almost a complete row; scale with 5 setae, apical slightly shorter than subapical. Sternites and pleurotergites without discal setae. Tergite II with 4 lateral setae; tergite VIII posteromarginal comb complete but irregular.

♂ Unknown.

COMMENTS. This species is most similar and closely related to *rhabdotus*, from Tonga and Fiji, which has distinct pronotal striations and usually only 3 lateral marginal setae on tergite II, whereas *rapaensis* usually has 4.

A sample of 8 ♀, 6 ♂ from the Cook Archipelago appear to be identical to the types of *rapaensis* except for completely dark forewings and broader striations on the metanotum. Males from this series are brown; sternites III–VII with transverse glandular areas; tergite VIII comb with a few irregular groups of very small microtrichia; tergite IX b, and b2 setae subequal in length, b1 setae much closer to b2 than to each other. The pronotal striations in this sample are also more distinct.

BIOLOGY. Unknown.

DISTRIBUTION. Rapa I in the Society Is.

MATERIAL EXAMINED. SOCIETY IS.: Holotype ♀ (BPBM); 2 ♀ paratypes (CAS).

DOUBTFULLY ASSOCIATED MATERIAL. COOK ARCHIPELAGO: 8 ♀, 6 ♂ (SMF).

Thrips rhabdotus Sakimura

(Figs 32–33, 54)

Thrips (Isothrips) rhabdotus Sakimura, 1969: 74–79. Holotype ♀, TONGA (USNM) [examined].

♀ Medium to large: uniformly brown species, antennal segment III and forewing base paler.

Antennae 7-segmented, ocellar setae III situated outside ocellar triangle. Pronotum with transverse striations. Metanotum with closely striate sculpture; campaniform sensilla present; median setae situated far behind anterior margin (Figs 32–33). Forewing first vein with an almost complete row of setae; scale with 5 setae, apical and subapical setae almost equal in length. Sternites and pleurotergites without discal setae. Tergite II with 3 lateral setae, 4th situated on the pleurite; tergite VIII posteromarginal comb com-

plete but short and slightly irregular, microtrichia arranged in groups (Fig. 54).

♂ Yellow with brown head; sternites III–VII each with a small, transverse glandular area; tergite VIII comb of irregular groups of very small microtrichia, tergite IX b1 setae longer than b2 and slightly closer to b2 than to each other.

COMMENTS. This species is most similar and closely related to *modicus*, which has short major head and thoracic setae, and to *rapaensis*, which has less distinct pronotal striations and slightly broader metanotal sculpture. They both have dark forewing bases.

Two samples of several males and females from Tonga (SMF) have been examined which differ from *rhabdotus* types in having bicoloured antennal segments IV & V, darker forewing base and pale tibiae; also the microtrichia of the comb are more evenly separated than in typical *rhabdotus*. The males from these samples are yellow, some appear bicoloured with orange internal pigment. Tergite VIII comb with longer but sparser microtrichia than typical *rhabdotus*; tergite IX without spines, b1 longer than b2 setae and situated closer to b2 than to each other. There are also 7 ♀, 2 ♂ from gladiolus flowers in Fiji (BMNH) and 1 ♀ from Fiji (Saki.) with similarly bicoloured antennae.

BIOLOGY. Has been found in rose, *Leucaena* and gardenia flowers.

DISTRIBUTION. Tonga, Fiji.

MATERIAL EXAMINED. TONGA: Holotype ♀ (USNM); 1 ♀, 1 ♂ paratype (Saki.); 6 ♀, 2 ♂ paratypes (BMNH); TONGA & FIJI: about 50 ♀, ♂ (BMNH).

DOUBTFULLY ASSOCIATED MATERIAL.

TONGA: 16 ♀, 4 ♂ (SMF).

Thrips rostratus Priesner

(Figs 34, 38, 44)

Thrips rostratus Priesner, 1934: 279–280. Holotype ♀, JAVA (SMF) [examined].

♀ Small to medium; uniformly brown, legs, forewings and antennae dark.

Antennae 7-segmented, ocellar setae III situated outside ocellar triangle (Fig. 38). Metanotum with striate sculpture; median setae situated behind anterior margin; campaniform sensilla absent (Fig. 34). Forewing first vein with 7 basal and 3 distal setae; scale with 5 setae, apical seta longer than subapical. Sternites and pleuroterg-

ites without discal setae. Tergite II with 3 lateral marginal setae; tergite VIII posteromarginal comb complete and regular.

♂ Unknown.

COMMENTS. The holotype is in rather poor condition and therefore some characteristics are difficult to see, but it appears to be most similar and probably related to *obscuripes*, also from Java. It differs in having shorter antennal segments (Figs 43–44), no metanotal campaniform sensilla and ocellar setae III situated further apart, away from the anterior margins of the ocellar triangle. It is also similar to *formosanus* which has antennal segment III pale and the Indian species *tanicus* is also related to this group.

BIOLOGY. Unknown.

DISTRIBUTION. Java, Celebes, Bali.

MATERIAL EXAMINED. JAVA: Holotype ♀ (SMF). CELEBES: 1 ♀. BALI: 2 ♀ (SO).

Thrips seticollis (Bagnall)

(Figs 35, 39, 56)

Taeniothrips seticollis Bagnall, 1915: 591–592.

Holotype ♀, WESTERN AUSTRALIA (BMNH) [examined].

Taeniothrips (*Isochaetothrips*) *seticollis* Bagnall: Sakimura, 1967c: 724.

Thrips seticollis (Bagnall): Bhatti, 1978: 191.

♀ Medium size; brown, forewings dark with pale base, antennal segment III and base IV pale.

Antennae 8-segmented; ocellar setae III situated within ocellar triangle (Fig. 39). Metanotum with striate sculpture; campaniform sensilla present; median setae at anterior margin (Fig. 35). Forewing first vein with a complete row of setae; scale with 5 setae, apical seta longer than subapical. Forelegs with a pretarsal claw (cf. *coprosmae* group IV). Sternites and pleurotergites without discal setae. Tergite II with 4 lateral marginal setae; tergite VIII posteromarginal comb complete and regular.

♂ Similar to ♀, paler brown; sternites III–VII each with a small, almost circular glandular area (Fig. 56); tergite VIII posteromarginal comb of only a few scattered, very short microtrichia; tergite IX b1 setae equal in length to b2 but closer together than to b2.

COMMENTS. Apart from *ceruo* this is the only species in its group to have the combined characteristics of 8-segmented antennae, a complete row of forewing first vein setae and median

metanotal setae at the anterior margin. It can be easily distinguished from *ceruo* by its much shorter ocellar setae III, long median postoculars and a much better developed comb. It is also unusual in having a pretarsal claw on the forelegs. The only other species in this region of study to have such a claw is *coprosmae* from New Zealand (group IV).

BIOLOGY. Unknown.

DISTRIBUTION. W. Australia.

MATERIAL EXAMINED. AUSTRALIA: W.A., Holotype ♀, 1 ♀ paratype, 2 ♀, 1 ♂ (BMNH).

Thrips setosus Moulton

(Figs 36, 40, 53)

Thrips setosus Moulton, 1928c: 304–305. Holotype ♀, JAPAN (CAS) [examined].

♀ Small; pale brown, forewings paler at base, antennal segment III and base IV & V pale.

Antennae 7-segmented; ocellar setae III situated outside ocellar triangle (Fig. 40). Metanotum with striate sculpture with a few reticulations medially; median setae situated far behind anterior margin; campaniform sensilla present (Fig. 36). Forewing first vein with 7 basal and 3 distal setae; scale with 5 setae, apical seta longer than subapical. Sternites without discal setae. Pleurotergites with 1–3 discal setae. Tergite II with 3 lateral marginal setae; tergite VIII posteromarginal comb complete although sometimes slightly irregular (Fig. 53).

♂ Pale brown; sternites III–VII each with a broad transverse glandular area; tergite VIII posteromarginal comb complete but of very short microtrichia and irregular; tergite IX b1 setae shorter than b2, their bases equidistant.

COMMENTS. This species is very closely related to the British species on *Mercurialis*, *fulvipes* Bagnall, which differs significantly only in its longer submedian postocular setae. It is also related to *brunneus* from Japan but it differs mainly in having paler antennal segments IV & V, ocellar setae III slightly further apart, slightly broader metanotal sculpture and comb on tergite VIII sometimes more irregular. The males of *setosus* differ from those of *brunneus* in being paler and having tergite IX b1 setae closer together. It also looks similar to *tanicus*, *formosanus*, *rostratus* and *obscuripes* but none of these has pleurotergal discal setae. Indeed, *setosus* and *brunneus* and the yellow species *xenos* are the only three species, considered in this work, that

lack sternal discal setae but have pleurotergal discs.

This species should not be confused with *Thrips setosus* Moulton, 1929: 97–98, from India which was synonymised with *T. subnudula* by Bhatti (1969a).

BIOLOGY. Very common in Japan where it is a pest, particularly on tomatoes, and transmits tomato spotted wilt virus (Kobatake *et al.*, 1984). Other host plants are listed by Miyazaki & Kudo (1988).

DISTRIBUTION. Japan, Korea.

MATERIAL EXAMINED. JAPAN: Holotype ♀ (CAS); 41 ♀, 1 ♂ (BMNH); 8 ♀, 3 ♂ (SO).

Thrips tabaci Lindeman

(Figs 37, 41–42, 45, 47, 55)

Thrips tabaci Lindeman, 1889: 61–75. Syntypes ♀, ♂, USSR. (depository unknown).

Thrips hololeucus Bagnall, 1914: 24. Lectotype ♀ JAPAN. (BMNH) [designated and synonymised by Mound, 1968: 67] [examined].

Ramaswamiahiella kallarensis Ananthakrishnan, 1961: 564. Holotype ♀, INDIA (TNA) [synonymised by Bhatti, 1980: 157] [not examined].

♀ Medium to small; yellow, brown or bicoloured; antennal segments III–V bicoloured; forewings pale.

Antennae 7-segmented; ocellar setae III situated near margins of ocellar triangle, usually just inside (Fig. 41). Metanotum with broadly striate sculpture often with a few reticulations medially; median setae situated far behind anterior margin; campaniform sensilla absent (Fig. 37). Forewing first vein with 7 basal and 4 (3–6) distal setae (Fig. 45); scale with 5 setae, apical seta longer than subapical. Sternites and pleurotergites without discal setae. Tergites laterally and pleurotergites with rows of numerous, fine microtrichia (Fig. 47). Tergite II with 3 lateral marginal setae; tergite VIII posteromarginal comb complete, of long, fine microtrichia and regular (Fig. 55). Tergite IX with only 1 pair of campaniform sensilla, the anterior pair absent (Fig. 55).

♂ Yellow to pale brown; similar to ♀; sternites III–V only each with a transverse glandular area; tergite VIII posteromarginal comb complete, of long fine microtrichia and regular at least medially; tergite IX b1 setae slightly shorter than b2, bases equidistant.

COMMENTS. *T. tabaci*, although variable in

colour, is readily recognised by the characteristics given in the key. The most similar pale species in the group are *flavus*, *flavidulus*, and *kodaikanalensis*. These, however, have two pairs of campaniform sensilla on tergite IX and are much larger. *T. flavus* and *flavidulus* are always pale yellow, *kodaikanalensis* is pale brown; their ocellar setae are also usually much closer together.

BIOLOGY. Highly polyphagous and common. It transmits TSWV in tobacco but is not known to be a vector outside northern Europe.

DISTRIBUTION. Worldwide but males have a restricted distribution and have been found only around the Mediterranean and by Bhatti (1980) in India.

MATERIAL EXAMINED. About 450 ♂, ♀ (BMNH).

Thrips tanicus Bhatti

Thrips montanus Ananthakrishnan & Jagadish, 1968: 363–364. Syntypes ♀, ♂, INDIA (TNA) [not examined].

Thrips tanicus Bhatti, 1969b: 381 (new name for *montanus* Ananthakrishnan & Jagadish, preoccupied by *Thrips montanus* Priesner.).

DESCRIPTION. Ananthakrishnan & Jagadish, 1968: 363–364.

COMMENTS. Brown species closely related to *formosanus*, *obscuripes* and *rostratus*. It is most similar to *obscuripes* but antennal segment III is slightly paler.

BIOLOGY. May be associated with *Ulex* flowers.

DISTRIBUTION. India.

MATERIAL EXAMINED. None.

Thrips taurus Bhatti

Thrips taurus Bhatti, 1980: 159–161. Holotype ♀, INDIA (JSB) [not examined].

DESCRIPTION. Bhatti, 1980: 159–161.

COMMENTS. Pale yellow species with a dark band on forewing. Most similar to the *palmi* group but distinct in having forewing first vein with 6 distal setae.

BIOLOGY. Unknown.

DISTRIBUTION. India.

MATERIAL EXAMINED. None.

***Thrips tectus* (zur Strassen)**

Taeniothrips tectus zur Strassen, 1975: 62–69.
Holotype ♀, BHUTAN (NHMB) [not examined].

Thrips tectus (zur Strassen) Bhatti, 1978: 191, 192, 195.

DESCRIPTION. Variation in characteristics discussed by Bhatti (1980: 161).

COMMENTS. Dark brown species, with dusky wings, 8-segmented antennae closely striate metanotum and a complete posteromarginal comb on tergite VIII. Ocellar setae III are also distinctively small. Its relationships are unclear but it may be closest to *himalayanus* and *tanicus*.

BIOLOGY. Possibly associated with *Arisaema* flowers.

DISTRIBUTION. Bhutan, Nepal.

MATERIAL EXAMINED. INDIA: 1 ♀ (BMNH).

***Thrips xenos* Bhatti**

Thrips xenos Bhatti, 1980: 162–164. Holotype ♀, INDIA (JSB) [not examined].

DESCRIPTION. Bhatti, 1980: 162–164.

COMMENTS. Yellow species with a few pleurotergal discal setae. This is a rare combination in Group II and unique in the Oriental Region. The males have an additional characteristic unique in the genus; abdominal sternites III–VII each has its glandular area dissected into 5–8 small, irregular areas.

BIOLOGY. Unknown.

DISTRIBUTION. India.

MATERIAL EXAMINED. None.

Group III

This is the smallest group in the Oriental fauna, comprising only seven species. It is characterised by having discal setae on sternites II or III to VI only. They are absent from sternite VII and from the pleurotergites. Also the median metanotal setae are usually situated behind the anterior margin, and six of the seven species have reticulate metanotal sculpture and 7-segmented antennae. The Australian species *setipennis* Bagnall is unique within the group as it has striate metanotal sculpture and 8-segmented antennae. The other six species contain two of the most common Malaysian species, *orientalis* with two closely related species *extensicornis* and *decens*,

and *parvispinus* with its related species *taiwanus* and *compressicornis*.

***Thrips compressicornis* Sakimura**

Isoneurothrips brevicornis Moulton & Steinweden, 1932: 165. Holotype ♀ MARQUESAS (BPBM) [examined].

Thrips (Isothrips) compressicornis Sakimura, 1969: 79. [new name for *I. brevicornis* Moulton & Steinweden, preoccupied by *Thrips brevicornis* Priesner].

♀ Medium to small; uniformly brown, forewings paler at base, antennal segment III and base of IV pale, tibiae pale.

Antennae 7-segmented; ocellar setae III situated outside ocellar triangle. Metanotum with polygonally reticulate sculpture; campaniform sensilla absent; median setae situated behind anterior margin. Forewing first vein with a complete row of setae, (7 basal and about 10 distal); scale with 5 setae, apical seta longer than subapical. Abdominal sternites III–VI with 3 or 4 pairs of discal setae; II with 0–2 discal setae; absent on sternite VII. Pleurotergites without discal setae. Tergite II with 3 lateral marginal setae; tergite VIII posteromarginal comb absent, or with a few short microtrichia laterally.

♂ Small, pale, yellow brown, similar to ♀. Sternites III to VII each with a large, transverse glandular area; tergite VIII posteromarginal comb indistinct; tergite XI b1 setae larger than b2, bases closer than to b2.

COMMENTS. This species is closely related to *parvispinus* and *taiwanus* which differ mainly in having more numerous sternal discal setae.

BIOLOGY. A series of 60 ♀, 15 ♂ has been examined from cucumber in Malaya, but this is unlikely to be the only host.

DISTRIBUTION. Malaya, Marquesas.

MATERIAL EXAMINED. MARQUESAS: Holotype ♀ (BPBM), MALAYA: 60 ♀, 15 ♂ (BMNH).

***Thrips decens* sp.n.**

(Figs 59, 64, 66)

♀ Macroptera. Colour uniformly brown; antennal segment III, tarsi and fore tibiae slightly paler.

Antennae 7-segmented; ocellar setae III situated inside ocellar triangle just behind first ocellus; all head setae small but postocular setae I &

III relatively well developed, II minute (Fig. 59). Pronotum distinctly striate with 3 pairs of posteromarginal setae (Fig. 59). Metanotal campaniform sensilla absent; sculpture reticulate, elongate posteriorly, with internal markings; median setae situated far behind anterior margin (Fig. 66). Forewing first vein often with almost a complete row of setae (10–14 basal + 2–3 distal); scale with 5 setae, apical seta longer than subapical. Abdominal sternites with 3 pairs of posteromarginal setae (II with 2 pairs); III–VI usually with at least 1 pair of discal setae, sometimes with 2 or 3 pairs; sternite II with 0–2 discal setae; sternite VII without discal setae. Pleurotergites without discal setae. Tergite II with 3 lateral setae, the 4th seta situated on the pleurotergite margin. Tergite VIII posteromarginal comb represented by a few small teeth laterally (Fig. 64).

Measurements (♀ Holotype in μm). Body length 1300. Ocellar setae III 25. Postocular setae I, 14; II, 2; III, 10. Pronotal posteroangular setae, inner 66; outer 58/62. Median metanotal setae 40.

♂ Macroptera. Colour and structure similar to ♀ although sternal discal setae sometimes restricted to 1 pair on III only. Abdominal sternites III to VII each with a transverse glandular area: tergite VIII posteromarginal comb absent; tergite IX b1 setae a little longer than b2, their bases a little closer to b2 than to each other.

Measurements (♂ paratype in μm). Body length 1150. Ocellar setae III 20/25. Postocular setae I 20; II 2; III 12. Pronotal posteroangular setae, inner 62; outer 58. Median metanotal setae 35. Tergite IX b1 setae length 38/42, distance between bases 16; b2 setae length 28/36, distance between bases 40.

COMMENTS. Although this species is described from 25 specimens, they are probably representatives of a single population and therefore may not show the full range of variation to be expected. It is most closely related and extremely similar to *orientalis* and *extensicornis* but has darker antennal segments IV & V and smaller metanotal reticulations than either of these, more forewing first vein setae than *extensicornis* and ocellar setae III situated inside the ocellar triangle, not outside as in *orientalis*.

BIOLOGY. On *Mussaenda mutabilis*.

DISTRIBUTION. Malaya.

MATERIAL EXAMINED. Holotype ♀.

MALAYA: Genting Highlands, alt. 4500 ft, on *Mussaenda mutabilis*, 4.x.1973 (L.A. Mound)

(BMNH). Paratypes. 17 ♀, 7 ♂, same data as holotype (1 ♀ CAS).

Thrips extensicornis Priesner

(Figs 60, 67)

Thrips extensicornis Priesner, 1934: 276–277. Holotype ♀, JAVA (SMF) [examined].

♀ Medium to small; uniformly dark brown, forewings dark, antennal segments III–V bicoloured.

Antennae 7-segmented; ocellar setae III situated inside ocellar triangle (Fig. 60). Metanotum with polygonal reticulations; campaniform sensilla absent; median setae situated behind anterior margin (Fig. 67). Forewing first vein with 7 basal and 2–3 distal setae; scale with 5 setae, apical setae longer than subapical. Most sternites, except VII, with 1 pair discal setae. Pleurotergites without discal setae. Tergite II with 4 lateral marginal setae: tergite VIII posteromarginal comb absent medially.

♂ Similar to ♀ but smaller; sternites III–VII each with a narrow, transverse glandular area; tergite VIII posteromarginal comb apparently absent; tergite IX b1 setae longer than b2 and closer to b2 than to each other.

COMMENTS. This species is closely related to *orientalis* but it has fewer forewing first vein setae and sternal discal setae, ocellar setae III inside the ocellar triangle and median metanotal setae nearer the anterior margin. It is also similar to *decens* but this has smaller metanotal reticulations, shorter ocellar setae III, more forewing first vein setae and sternal discals and brown antennal segments III–V.

BIOLOGY. Has been found in flowers of *Clorodendron*, *Exostemma* and *Rhodomyrtus*.

DISTRIBUTION. Java, Riouw Archipelago, Taiwan, Philippines.

MATERIAL EXAMINED. JAVA: Holotype ♀; 1 ♀, 1 ♂ paratypes (SMF).

Thrips orientalis (Bagnall)

(Figs 61, 68–69)

Isoneurothrips orientalis Bagnall, 1915: 593–594.

Lectotype ♀, SARAWAK. (BMNH) [designated by Sakimura, 1967b: 432] [examined].

Thrips setipennis Steinweden & Moulton, 1930: 25–26. Holotype ♀ CHINA (CAS) [synonymised by Sakimura, 1967b: 432] [examined].

Thrips (Isothrips) orientalis (Bagnall): Priesner, 1940: 54.

♀ Medium to large; uniformly dark brown, legs dark, forewings dusky, antennae dark, segments III and base of IV pale.

Antennae 7-segmented; ocellar setae III situated outside ocellar triangle (Fig. 61). Metanotum with polygonal reticulations; median setae situated far behind anterior margin; campaniform sensilla absent (Fig. 68). Forewing first vein with numerous setae, 7 basal and 8–10 distal; scale with 5 setae, apical shorter than subapical. Sternites III–VI usually with 1–3 pairs of discal setae laterally; sternite II with 0–2; VII without discal setae. Pleurotergites without discal setae. Tergite II with 3 lateral setae, 4th on pleurite; tergite VIII posteromarginal comb absent medially.

♂ Small, brown, similar to ♀; sternites III–VII each with a long, narrow glandular area; abdominal tergite VIII posteromarginal comb absent; tergite IX b1 setae much longer than b2 and much closer to b2 than to each other (Fig. 69).

COMMENTS. This species is very closely related to *extensicornis*, which differs in having only 2–3 distal forewing first vein setae, ocellar setae III situated inside the ocellar triangle and median metanotal setae slightly nearer the anterior margin. *T. setipennis* Steinweden & Moulton was distinguished from other *Thrips* by having numerous forewing setae and lacking a posteromarginal comb on tergite VIII. The *Isothrips* and *Isoneurothrips* complexes were not considered, however, and the holotype ♀ and paratype ♂ examined are indistinguishable from *orientalis*. It is a very common and variable species. This structural variability is discussed by Bhatti (1980).

BIOLOGY. May be particularly associated with Jasmin flowers. (Bhatti, 1980)

DISTRIBUTION. Widespread throughout the Indo-malayan Region: recorded from India to Hawaii; India, Thailand, China, Japan, Philippines, Malaya, Java, Borneo, Sarawak, Tahiti, Hawaii; recorded here for the first time from outside the Oriental and Pacific Regions.

MATERIAL EXAMINED. SARAWAK: Lectotype ♀; 1 ♀, 1 ♂ paralectotypes of *orientalis* (BMNH). MALAYA: 6 ♀, 10 ♂ (BMNH). TAHITI: 6 ♀ (BMNH). JAPAN 8 ♀ (SO). THAILAND: 3 ♀, 4 ♂ (BMNH). CHINA: Holotype ♀, 1 ♂ paratype of *setipennis* Steinweden & Moulton (CAS). INDIA: 36 ♀, 16 ♂

(BMNH). TRINIDAD: Tacamgua, 2 ♀, 3 ♂, in white flowers, 25.v.1972 (*B.R. Pitkin*) (BMNH).

Thrips parvispinus (Karny)

(Fig. 62)

Isoneurothrips parvispinus Karny, 1922: 106.

Syntypes ♀, ♂, THAILAND (SMF) [not examined].

Isoneurothrips jenseni Karny, 1925: 7–10. Syntypes ♀, SUMATRA (SMF) [synonymised by Priesner, 1934: 260] [not examined].

Thrips (Isoneurothrips) parvispinus (Karny), Priesner, 1934: 259.

♀ Medium to large; uniformly brown, forewings dark with base pale, antennae brown, segment III with base pale.

Antennae 7-segmented; ocellar setae situated near margins of ocellar triangle (Fig. 62). Metanotum with polygonally reticulate sculpture; median setae situated near but behind anterior margin; campaniform sensilla absent (cf. Fig. 67). Forewing first vein with a complete row of setae; scale with 5 setae, apical seta longer than subapical. Sternites III–VI with 10–12 discal setae; sternites II and VII without discal setae. Pleurotergites without discal setae. Tergite II with 4 lateral marginal setae, 4 sometimes displaced to pleurite; tergite VIII posteromarginal comb absent.

♂ Small, pale brown similar to ♀; sternites III to VII each with a transverse glandular area; tergite VIII posteromarginal comb absent; tergite IX b1 setae slightly longer than b2, bases equidistant.

COMMENTS. This species is closely related to *compressicornis*, which has paler antennal segments I to base IV and 6–8 sternal discal setae, and to *taiwanus*, which has paler antennal segments III–V and 8–10 sternal discal setae. Both these species also have ocellar setae III distinctly outside the ocellar triangle and median metanotal setae further behind the anterior margin.

BIOLOGY. Common and polyphagous.

DISTRIBUTION. Thailand, Malaya, Singapore, Java, Sumatra, Celebes, Solomon Is, Philippines, New Guinea, the Torres Straits, Australia (Queensland).

MATERIAL EXAMINED. About 100 ♂, ♀ from Malaya, Singapore, Java, Sumatra, New Guinea, the Torres Straits and Australia (Queensland) (BMNH).

***Thrips setipennis* (Bagnall)**

(Figs 64, 65)

Physothrips setipennis Bagnall, 1916b: 399. Lectotype ♂, AUSTRALIA, Victoria (BMNH) (designated by Mound, 1968: 42) [examined].

Physothrips chaetoneurus Karny, 1920: 37. Syn-types ♀, AUSTRALIA, Qld (NR) [synonymised by Sakimura, 1967c: 724] [not examined].

Physothrips ignobilis Bagnall, 1926: 101. Lectotype ♀, AUSTRALIA, Victoria (BMNH) (designated by Mound, 1968: 42) [synonymised by Sakimura, 1967c: 724] [examined].

Physothrips myrsiniicola Bagnall, 1926: 103. Holotype ♂, AUSTRALIA, Victoria (BMNH) [synonymised by Sakimura, 1967c: 724] [examined].

Thrips setipennis (Bagnall) Bhatti, 1978: 191.

♀ Medium; uniformly brown, antennal segment III and base IV pale.

Antennae 8-segmented; ocellar setae III situated on anterior margins of ocellar triangle (Fig. 63). Metanotum with striate sculpture; campaniform sensilla absent; median setae situated behind anterior margin. Forewing first vein with a complete row of setae; scale with 5 setae, apical seta shorter than subapical. Abdominal sternites III–VI with 5–12 discal setae situated close to posterior margin (Fig. 65); sternite II and VII without discal setae. Pleurotergites without discal setae. Abdominal tergite II with 4 lateral marginal setae; tergite VIII posteromarginal comb complete, microtrichia fine and regular.

♂ Pale yellow brown, similar to ♀; sternites III to VII each with a small, narrow transverse glandular area; tergite VIII posteromarginal comb very short, sparse and indistinct; tergite IX b1 setae slightly shorter than b2, bases equidistant.

COMMENTS. This species is unique, within the group of species which have sternal discal setae on III–VI only, in having 8-segmented antennae and striate metanotal sculpture. It was described as being very similar to *seticollis* which, although superficially similar, belongs to a group of species without sternal discal setae.

BIOLOGY. Unknown.

DISTRIBUTION. Australia; Tasmania, Victoria, New South Wales, Queensland, Western Australia.

MATERIAL EXAMINED. AUSTRALIA: Victoria,

lectotype ♂; 2 ♀, 3 ♂ paralectotypes of *setipennis*; lectotype ♀, 1 ♀ paralectotype of *ignobilis*; holotype ♂ of *myrsiniicola* (BMNH); 45 ♂, ♀ from Tasmania, Victoria, New South Wales and Queensland (BMNH).

***Thrips taiwanus* Takahashi**

Isoneurothrips pallipes Moulton, 1928b: 296–297.

HOLOTYPE ♀, TAIWAN (CAS) [examined].

Thrips (*Isoneurothrips*) *taiwanus* Takahashi, 1936: 440. [new name for *I. pallipes* Moulton, preoccupied by *Thrips pallipes* Bagnall (= *hawaiiensis* Morgan)].

♀ Medium; uniformly brown, wings dark with base paler, legs slightly paler, antennal segment III and bases of IV and V pale.

Antennae 7-segmented; ocellar setae III situated outside ocellar triangle. Metanotum with reticulate sculpture; campaniform sensilla absent; median setae situated far behind anterior margin. Forewing first vein with a complete row of setae; scale with 5 setae, apical seta longer than subapical. Abdominal sternites III–VI with about 8–10 discal setae, sternites II and VII without discal setae. Pleurotergites without discal setae. Tergite II with 3 lateral marginal setae; tergite VIII posteromarginal comb absent or represented by only a few small microtrichia.

♂ Unknown, although a series of 11 ♀, 2 ♂ from Bali (SO) have been examined, the females of which are indistinguishable from *taiwanus*. These males are paler, yellow brown with darker median areas on the tergites, sternites III to VII each with a transverse glandular area; tergite VIII posteromarginal comb absent or very short and indistinct; tergite IX b1 setae longer than b2, bases equidistant.

COMMENTS. This species is most closely related to *compressicornis*, which has paler antennal segments I & II, darker V and 6–8 sternal discal setae, and *parvispinus*, which has dark antennal segments IV & V, 10–12 sternal discal setae, ocellar setae III slightly closer together and median metanotal setae nearer anterior margin. It is also similar to *orientalis*, *extensicornis* and *decens*, but these all have a less complete row of forewing first vein setae. *T. decens* also has ocellar setae III distinctly within ocellar triangle.

BIOLOGY. Unknown.

DISTRIBUTION. Taiwan, Thailand, Bali, Philippines, Malaya.

MATERIAL EXAMINED. TAIWAN: Holotype ♀,

1 ♀ paratype (CAS), THAILAND: 3 ♀ (SO). BALI: 11 ♀, 2 ♂ (SO). MALAYA: 6 ♀ (BMNH).

Group IV

This group contains probably the most setose of all *Thrips* species, many of them endemic to Australia and New Zealand. It is characterised by the presence of discal setae on sternites II or III to VII and on the pleurotergites, and most species have the median metanotal setae situated behind the anterior margin. The New Zealand species *phormiicola* sometimes has short forewings but, when fully developed, the forewings of most Australian and New Zealand species have numerous setae on the first vein. All other species have only 2 or 3 distal setae and a basal group of 7 or 8. The four New Zealand species, *obscuratus*, *coprosmae*, *austellus* and *phormiicola*, have 3 pairs of posteromarginal setae on sternite II, whereas the majority of *Thrips* species have only 2 pairs. Indeed the only other species in this study to share this characteristic are *bianchii* and *insignis* (group I) both from New Caledonia. *T. australis*, originally from Australia, is now very common wherever *Eucalyptus* is grown on a large scale. Its relationships are unclear but it may be distantly related either to the New Zealand or African faunas. However, it is most likely to be closest to the Australian 'plague thrips', *imuginis*, and the Indian species *subnudula*. They are small, pale species and very distinct in being covered with numerous, small setae. The hind margin of the pronotum bears 4 or 5 pairs of setae and most sternites have more than 3, often as many as 6 pairs of posteromarginal setae. There are also a number of other 'species', including *unispinus* from group V, which share some or all of these characteristics. These complex relationships are discussed under *imuginis*, the most common species in the group. There is an interesting group of 4 species which reflect the Palaerctic relationships of the northern Indian and Pakistan fauna. These comprise the new species *evulgo* from Pakistan, *cedri* from the Simla Hills, H.P. and the European species *meridionalis* and *vulgatissimus*. The affinities of the remaining 4 species in this group are not clear. *T. apicatus* has numerous, long sternal and pleurotergal discal setae reminiscent of *imuginis* and *subnudula* but is otherwise morphologically more similar to *coloratus* (group V) and therefore probably not related. The new species *faceatus* from Malaya has remarkably broad setae and is uniquely coloured, but has some similarities to *apicatus* and *subnudula*. The last two species,

novocaledonensis, known only from New Caledonia, and *alliorum*, common on onions from Taiwan to Hawaii, share a number of characteristics although they are probably not related. The presence of pleurotergal discal setae in these two species is not always constant and, although they are most closely related to other members of group IV, *alliorum* is, in many ways, similar to *kotoshoi* and *brevistylus* in group V, and *novocaledonensis* could easily be mistaken for *hawaiiensis*, also in group V.

Thrips alliorum (Priesner)

(Figs 72, 85, 91, 107)

Taeniothrips alliorum Priesner, 1935: 128–129.

Holotype ♀, TAIWAN. (SMF) [examined].

Taeniothrips carteri Moulton, 1937a: 183–184.

Holotype ♀, HAWAII. (CAS) [? synonymised by Jacot-Guillarmod, 1975: 985] [examined].

Thrips alliorum (Priesner): Bhatti, 1978; 190.

♀ Medium to large; uniformly brown, legs brown, antennae brown, III slightly paler, forewings pale.

Antennae 8-segmented; ocellar setae III situated outside ocellar triangle; median postocular setae situated far behind rest of row (Fig. 72). Metanotal sculpture striate with a few ill-formed reticulations medially; campaniform sensilla absent; median setae situated far behind anterior margin (Fig. 91). Forewing first vein with 7 basal and 3 distal setae, scale with 5 setae, apical seta longer than subapical. Abdominal sternites III–VII with 8–12 discal setae; sternite II with 0–2 discal setae. Pleurotergites usually with 1–3 discal setae, rarely with 0–6 (Fig. 107). Tergite II with 3 lateral setae, 4th on pleurite; tergite VIII posteromarginal comb may appear absent or represented by a few microtrichia laterally and a very short lobed flange or craspedum medially (Fig. 85).

♂ Similar to ♀; often brachypterous; sternites III–VII each with a large, transverse glandular area; tergite VIII comb of a few microtrichia laterally; tergite IX b1 setae situated anterior to b2, between campaniform sensilla, subequal in length to b2 and slightly closer together than to b2.

COMMENTS. The elongate head is typical of species that live on grasses and other monocotyledons. The holotype of *Taeniothrips carteri* from Taiwan (not to be confused with *Isoneurothrips carteri* Moulton from Hawaii, transferred to *Neurothrips* by Sakimura, 1967a), has more pleurotergal discal setae and a better developed comb

than that of *alliorum* but they are otherwise indistinguishable, and specimens resembling both are commonly found on onions. The most similar species in overall appearance are *kotoshoi* and *brevistylus* but these both have dark wings and the median metanotal setae situated at the anterior margin and neither has any pleurotergal discal setae.

BIOLOGY. On onions.

DISTRIBUTION. Taiwan, Japan, Korea, Manchuria, China, Hawaii.

MATERIAL EXAMINED. TAIWAN: Holotype ♀ of *alliorum*, 7 ♀, 3 ♂ (Saki.). HAWAII: Holotype ♀ of *carteri* (CAS), 4 ♀, 3 ♂ (BMNH). CHINA: 1 ♀ (BMNH).

Thrips apicatus Priesner

(Figs 70, 83, 88, 92)

Thrips apicatus Priesner, 1934: 264. Lectotype ♀, INDIA (SMF) [designated by Bhatti, 1980: 122] [examined].

♀ Medium to small; uniformly yellow, abdominal segment X sometimes dark, wings pale, antennae pale with segments III or IV–V bicoloured, VI & VII dark.

Antennae 7-segmented; ocellar setae III situated outside ocellar triangle (Fig. 70). Metanotal campaniform sensilla present; sculpture striate; median setae situated behind anterior margin (Fig. 92). forewing first vein with 7 basal and 3 distal setae; scale with 5 setae, apical seta longer than subapical. Abdominal sternites III–VII with numerous, usually more than 20, long discal setae (Fig. 83). Pleurotergites with 2–6 discal setae. Tergite II with 4 lateral marginal setae; tergite VIII posteromarginal comb irregular and sometimes absent medially (Fig. 88).

♂ Males of this species have not been examined but the following characteristics have been taken from Bhatti (1980) and Ananthakrishnan & Jagadish (1966). Yellow; sternites III to VII each with a transverse glandular area; tergite VIII posteromarginal comb absent; tergite IX b1 setae longer than b2.

COMMENTS. There are few species in the group that have as many sternal or pleurotergal discal setae. Pale species that have numerous pleurotergal discal setae are: *austellus*, with a complete row of forewing first vein setae; *australis*, which also has a complete row of first vein setae and reticulate metanotal sculpture; *imiginis*, also with a reticulate metanotum and 4 or 5 pairs of pronotal posteromarginal setae; and *subnudula*,

distinct in having 6 pairs of sternal posteromarginal setae and, like *imiginis*, with 5 pairs of pronotal posteromarginal setae. The Indian species *cedri* is also somewhat similar but has a complete regular comb on tergite VIII. Apart from the pleurotergal discal setae, *apicatus* is almost indistinguishable from *coloratus* in group V. The lectotype and paralectotype females have the extreme tip of tergite X brown. One female from the Philippine Is has been examined which not only has a completely dark tergite X but also more distinct tergal antecostal ridges. Two females examined from Thailand (BMNH) are completely pale but otherwise identical. Bhatti (1980) discusses this variation more fully.

BIOLOGY. Often found in *Acacia* flowers.

DISTRIBUTION. India, Thailand, Philippines.

MATERIAL EXAMINED. INDIA: Lectotype ♀, 1 ♀ paralectotype (SMF). THAILAND: 10 ♀ (BMNH). PHILIPPINES: 1 ♀.

Thrips austellus Mound

(Figs 74, 93)

Thrips austellus Mound, 1978: 618. Holotype ♀, NEW ZEALAND (NZAC) [not examined].

♀ Small; yellow species with antennal segments II and IV–VII brown.

Antennae 7-segmented; ocellar setae III situated outside ocellar triangle (Fig. 74). Metanotal campaniform sensilla sometimes present; sculpture with reticulations medially; median setae situated far behind anterior margin (Fig. 93). Forewing first vein with a complete row of setae; scale with 5 setae, apical seta longer than subapical. Abdominal sternites III–VII with 8–10 discal setae; sternite II with 3 pairs of posteromarginal setae. Pleurotergites with 3–6 discal setae. Tergite II with 3 lateral marginal setae, 4 displaced onto pleurite; tergite VIII posteromarginal comb complete but microtrichia short and sometimes irregular.

♂ Unknown.

COMMENTS. This species is most closely related to *obscuratus*, *coprosmae* and *phormiicola*, all from New Zealand, and is also somewhat similar to *australis*. They all have a complete row of forewing first vein setae and, apart from *obscuratus*, at least partly reticulate metanotal sculpture. The four New Zealand species also have 3 pairs of posteromarginal setae on sternite II, an unusual feature in the genus shared also, only by the two New Caledonian species *bianchii* and

insignis (group I) in the Oriental and Pacific Regions.

BIOLOGY. Possibly associated with *Clematis* flowers.

DISTRIBUTION. New Zealand.

MATERIAL EXAMINED. NEW ZEALAND: 5 ♀ (BMNH).

Thrips australis (Bagnall)

(Figs 71, 94, 105–106)

Isoneurothrips australis Bagnall, 1915: 592–593.

Lectotype ♀, AUSTRALIA, W.A. (BMNH) [designated Mound, 1968: 42] [examined].

Thrips australis (Bagnall), Bhatti, 1980: 112.

♀ Large; bicoloured, mostly yellow with brown markings, wings pale with setae dark, antennal segments IV–VII, II and basal half of III dark, abdominal tergites VIII or IX–X and median patches variably on II–VII or VIII dark.

Antennae 7-segmented; ocellar setae situated just inside ocellar triangle, near anterior margins (Fig. 71). Metanotal campaniform sensilla present; sculpture polygonally reticulate; median setae situated far behind anterior margin (Fig. 94). Forewing first vein with a complete row of numerous, short setae; scale with 6 setae, apical seta longer than subapical. Abdominal sternites III–VII with 15 to 40, usually about 20 discal setae. Pleurotergites also with numerous, 6 to 10, discal setae (Fig. 106). Tergite II with 4 lateral marginal setae; tergite VIII posteromarginal comb absent medially.

♂ Smaller, paler, yellow brown, similar to ♀; sternites III to VII each with a transverse glandular area; tergite VIII posteromarginal comb complete but short and very irregular, microtrichia indistinct; tergite IX b1 setae shorter than b2, bases slightly closer to b2 than to each other.

COMMENTS. This is a distinctively coloured species with an unusually shaped antennal segment VI (Fig. 105). Its closest relatives appear to be *imuginis* and *subnudula* and possibly also the group of four species from New Zealand.

BIOLOGY. Found in a wide variety of flowers but particularly associated with *Eucalyptus* and known as the 'gum tree thrips'. Host specificity is discussed by Kirk (1987).

DISTRIBUTION. An Australian species which has spread to warmer countries worldwide.

MATERIAL EXAMINED. AUSTRALIA: Lecto-

type ♀, 2 ♂ paralectotypes, also about 170 ♀, ♂ worldwide (BMNH).

Thrips cedri Bhatti

Thrips cedri Bhatti, 1980: 129–130. Holotype ♀, INDIA (JSB) [not examined].

DESCRIPTION. Bhatti, 1980: 129–130.

COMMENTS. Bicoloured species known only from the holotype from Simla Hills of northern India, it appears to be most closely related to the Palaearctic fauna, particularly the Pakistan species *evulgo* and the European species *vulgatissimus* and *meridionalis*, all of which are brown.

BIOLOGY. Described from male cones of *Cedrus deodara*.

DISTRIBUTION. India.

MATERIAL EXAMINED. None.

Thrips coprosmae Mound

(Figs 76, 95, 108)

Thrips coprosmae Mound, 1978: 618–620. Holotype ♀, NEW ZEALAND (NZAC) [not examined].

♀ Small to medium; pale to dark brown or bicoloured, head and thorax often paler.

Antennae 7-segmented; ocellar setae situated outside ocellar triangle (Fig. 76). Foreleg with a pretarsal claw (Fig. 108). Metanotal campaniform sensilla absent; sculpture with some reticulations medially; median setae situated far behind anterior margin (Fig. 95). Forewing first vein with a complete row of setae; scale with 5 setae, apical seta longer than subapical. Abdominal sternites III–VII with 5–10 discal setae; sternite II with 3 pairs of posteromarginal setae. Pleurotergites with 2–3 discal setae. Abdominal tergite II with 3 lateral marginal setae; tergite VIII posteromarginal comb complete but microtrichia irregular and sometimes sparse (cf. Fig. 90).

♂ Similar to ♀; sternites IV or V–VII each with a small, circular glandular area; tergite VIII posteromarginal comb complete but microtrichia indistinct; tergite IX b1 setae much longer and stouter than b2 and bases closer to b2 than to each other.

COMMENTS. This species is related to the other 3 New Zealand species *austellus*, *obscuratus* and *phormiicola*, but has the unusual characteristic of a pretarsal claw on the forelegs shared only by

seticollis from australia (group II), within the Oriental and Pacific Regions.

BIOLOGY. Thought to be specific to *Coprosma robusta*, feeding on young terminal shoots.

DISTRIBUTION. New Zealand.

MATERIAL EXAMINED. NEW ZEALAND: 84 ♀, ♂ (BMNH).

Thrips evulgo sp.n.

(Figs 73, 89, 96, 103)

♀ Macroptera. Colour uniformly brown with tibiae, tarsi and antennal segments III and base of IV slightly paler, forewing brown with base slightly paler. Body setae small and inconspicuous.

Antennae 7-segmented, segments short and rounded (Fig. 103); ocellar setae III situated outside ocellar triangle; postocular setae I well developed, subequal to III, other postoculars small (Fig. 73). Pronotum with transverse striations and 3 pairs of posteromarginal setae (Fig. 73). Metanotal campaniform sensilla absent; median setae short, equal to or shorter than lateral setae and situated far behind anterior margin; sculpture arcuate anteriorly, striate posteriorly (Fig. 96). Forewing first vein with 7 basal and 3 distal setae; scale with 5 setae, apical seta longer than subapical. Abdominal sternites with 3 pairs of posteromarginal setae (2 on II), sternites II or III–VII with discal setae, 8–10 on V, 10–18 on VII. Pleurotergites with 1–3 discal setae. Tergite II with 3 lateral setae only. Tergite VIII posteromarginal comb complete, microtrichia long and fine (Fig. 89).

Measurements (♀ Holotype in μm). Body length 1140. Ocellar setae III 18. Postocular setae I 18; II 4; III 6. Pronotal posteroangular setae, inner 38/42; outer 32/38. Metanotal setae, median 18/24; lateral 24/26.

♂ Unknown.

COMMENTS. This species probably represents the Palaearctic element of the Pakistan fauna. It appears to be most closely related to the larger, brown, European species *vulgatissimus* and *meridionalis* and particularly to the unique holotype of *cedri* from N. India, a bicoloured species. They are distinct from the Australian and New Zealand group of species in having only 7 basal and 2–3 distal forewing first vein setae and from the rest of group IV by having a long, fine, regular comb on tergite VIII.

BIOLOGY. Found in flowers of compositae.

DISTRIBUTION. Pakistan.

MATERIAL EXAMINED. Holotype ♀. PAKISTAN: Hazara Province, Naran/Kaghan-Tal 2400 m, compositae flowers, 26.vii.1981 (W. Heinz) (SMF T 10483). Paratypes. 13 ♀, same data as holotype (8 ♀ in BMNH).

Thrips facetus sp.n.

(Figs 75, 84, 97, 104)

♀ Macroptera. Bicoloured with short, stout, dark setae. Mostly pale yellow with antennal segments I, VI & VII, apex of III–V brown; abdominal tergites II–VII with dark antecostal ridge and dark transverse patch in anterior half, reduced to a median patch in posterior half, VIII–X pale brown.

Antennae 7-segmented (Fig. 104); ocellar setae III situated outside ocellar triangle, lateral to first ocellus; all postocular setae well developed (Fig. 75). Pronotum finely striate with numerous, stout discal setae and 3 pairs posteromarginal setae (Fig. 75). Metanotal campaniform sensilla present but indistinct; median setae situated behind anterior margin; sculpture striate, converging posteriorly (fig. 97). Forewing first vein with 7 basal and 3 distal setae; scale with 5 setae arranged in 2 groups, apical seta longer than subapical. Abdominal sternites with 3 pairs of posteromarginal setae (2 pairs on II), sternites II–VII with long discal setae, 18–20 on V, 17–19 on VII. Pleurotergites with 4–8 discal setae. Tergite II with 4 lateral setae. Tergite VIII posteromarginal comb complete, long and very fine (Fig. 84). Tergite IX very short, X long, XI well developed (Fig. 84).

Measurements (♀ Holotype in μm). Body length 1378. Ocellar setae III 30. Postocular setae I 25; II 22; III 24. Pronotal posteroangular setae, inner 38/42; outer 42. Tergite IX median length 40. Tergite X median length 84.

♂ Unknown.

COMMENTS. Although known from only 3 specimens, this species is described, as it is remarkable in having extremely broad setae particularly on the head, wings and thorax, and a distinctive abdominal colour pattern; antennal segments III–VII are sparsely setose and have numerous rows of microtrichia; the ovipositor is long and appears to extend somewhat beyond the end of the abdomen; tergite IX is particularly short and X long. The specimen from Bangladesh is somewhat paler than the other two and may be teneral.

The new species is most similar to *apicatus*

with which it shares the characteristics of long sternal discal setae and numerous pleurotergal discs. The numerous pronotal discs and grouping of forewing scale setae are reminiscent of *subnudula*. Its relationships, however, remain unclear.

BIOLOGY. Unknown.

DISTRIBUTION. Malaya.

MATERIAL EXAMINED. Holotype ♀. MALAYA: Tanah Rata, 17.iii.1976 (W. Suzuki) (SO). Paratypes: 1 ♀ same data as holotype (BMNH); 1 ♀ BANGLADESH: Burirhat (Distr. Rangpur), from yellow tray, xii. 1981, (A. van Harten) (SMF, T.11003).

Thrips imaginis Bagnall

(Figs 77, 98, 110)

Thrips imaginis Bagnall, 1926: 111. Syntypes ♀, ♂, AUSTRALIA: Victoria and South Australia. (4 ♀, 2 ♂ syntypes BMNH) [examined].

Thrips fortis Bagnall, 1926: 109. Holotype ♀, AUSTRALIA: Victoria (BMNH) [synonymised by Mound, 1968: 65] [examined].

Neophysopus io Girault, 1927: 1. Lectotype ♀, AUSTRALIA: Qld. (QM) [designated and synonymised by Pitkin, 1978: 369] [not examined].

Neophysopus aureolus Girault, 1928: 3. Syntypes ♀, AUSTRALIA: Qld. (QM) [synonymised by Pitkin, 1978: 369] [not examined].

Aptinothrips apertus Kelly & Mayne, 1934: 33. Lectotype larva, AUSTRALIA: Qld. (BMNH) [designated and synonymised by Palmer, 1975: 185] [examined].

♀ Small to medium; uniformly pale yellow-brown or bicoloured, head and thorax paler, abdomen brown.

Antennae 7-segmented; ocellar setae III short, situated inside ocellar triangle but just behind first ocellus, near anterior margins (Fig. 77). Pronotum with 4–5 pairs of posteromarginal setae (Fig. 77). Metanotum with reticulate sculpture; campaniform sensilla present; median setae situated far behind anterior margin (Fig. 98). Forewing first vein with 7 basal and 3–4 distal setae; scale with 5 setae, apical seta longer than subapical. Abdominal sternites III–VII each with 15–25 discal setae, often with 1 or 2 additional setae near posterior margin; sternite II sometimes with 1 or 2 discs. Pleurotergites with 1–3 discal setae. Tergite II with 3 lateral marginal setae; tergite VIII posteromarginal comb represented by a few microtrichia laterally.

♂ Similar to ♀; sternites III to VII each with a narrow, transverse glandular area; tergite VIII posteromarginal comb indistinct; tergite XI b1 setae shorter than b2, bases slightly closer to b2 than to each other (Fig. 110).

COMMENTS. This species is most similar to *subnudula* from India, which differs in having several more pairs of sternal posteromarginal setae, numerous pronotal discal setae and very short posteroangulars. *T. unispinus* from the Solomon Is also shares most characteristics of *imaginis* but has only 1 pair of long pronotal posteroangular setae and does not have pleurotergal discal setae. It is therefore not included in the same species group. Two ♀ with pleurotergal discal setae and short pronotal posteroangular setae, and 9 ♀, 5 ♂ from New Guinea (BMNH) without pleurotergal discal setae have been examined which are otherwise very similar to *imaginis* and *subnudula*. These characteristics confuse relationships and are discussed more fully in the introduction to groups and Table 3 (p. 48).

BIOLOGY. This is the 'Plague Thrips' of eastern Australia, a pest of apple and other fruit trees. The damage caused is typical of flower thrips. Direct feeding damage causes discoloration of petals, deformation of the reproductive parts, shortage of pollen, poor fruit set or distorted and scarred fruit. Host specificity is discussed by Kirk (1987).

DISTRIBUTION. Tasmania, Australia, New Zealand, New Caledonia, New Guinea, Fiji.

MATERIAL EXAMINED. 4 ♀, 2 ♂ Syntypes of *imaginis*, Holotype ♀ of *fortis*, lectotype larva of *apertus* (BMNH). Also about 180 ♀, ♂ from throughout the distribution range (BMNH).

Thrips meridionalis (Priesner)

Taeniothrips meridionalis Priesner, 1926: 301.

Lectotype ♀, YUGOSLAVIA (SMF) [designated by Bhatti, 1980: 147] [not examined].

Thrips meridionalis (Priesner), Bhatti, 1978: 191, 193.

DESCRIPTION. Priesner, 1926: 301.

COMMENTS. Large brown species very similar to *vulgatissimus*.

BIOLOGY. Found in flowers of a wide variety of plants and is known to damage flowers of orchard trees in Europe.

DISTRIBUTION. Mainly a Mediterranean distribution, Africa, Europe, Central Asia. Recorded from Nepal by zur Strassen (1976: 58).

MATERIAL EXAMINED. MEDITERRANEAN: about 50 ♀, 25 ♂ (BMNH).

***Thrips novocaledonensis* (Bianchi)**

(Figs 78, 86, 99)

Taeniothrips novocaledonensis Bianchi, 1944: 270–273. Holotype ♀. NEW CALEDONIA (BPBM) [not examined].

Thrips novocaledonensis (Bianchi): Bhatti, 1978: 191.

♀ Medium; uniformly mid-brown, antennal segment III and base of forewing paler.

Antennae 8-segmented; ocellar setae III situated outside ocellar triangle (Fig. 78). Metanotal campaniform sensilla present; sculpture striate; median setae situated at or near anterior margin (Fig. 99). Forewing first vein with 9–12 basal and 3 distal setae; scale with 5 setae, apical seta longer than subapical. Abdominal sternites II–VII with discal setae, about 16 on III–VII. Pleurotergites with 0–3, usually 2–3, discal setae. Tergite II with 4 lateral setae; tergite VIII posteromarginal comb complete but microtrichia short and irregular (Fig. 86).

♂ Similar to ♀ although often without pleurotergal discal setae, but usually with more than 7 basal forewing first vein setae. Sternites III to VII each with a narrow, transverse glandular area. Tergite VIII posteromarginal comb complete but irregular. Tergite IX b1 setae larger than b2, distance between bases more or less equal.

COMMENTS. This species is very similar in appearance to, and may easily be mistaken for, the very common *hawaiiensis* which may be distinguished by having pale legs, only 7 basal forewing first vein setae and no pleurotergal discals and is therefore probably not closely related. The only group IV species that looks similar to *novocaledonensis* is *alliorum*. This species is quite distinctive, however, in head shape and position of postocular setae. It also has pale forewings, median metanotal setae situated behind anterior margin and tergite VIII posteromarginal comb absent medially.

BIOLOGY. Common species found in flowers of *Lugunaria* and composite weeds.

DISTRIBUTION. New Hebrides, Norfolk I., previously known only from New Caledonia.

MATERIAL EXAMINED. NEW CALEDONIA: 5 ♀, 10 ♂ paratypes (BPBM). NEW HEBRIDES: 15 ♀, 12 ♂ (BMNH). NORFOLK I: 7 ♀, 7 ♂ (BMNH).

***Thrips obscuratus* (Crawford)**

(Figs 80, 90, 101)

Isoneurothrips obscuratus Crawford, 1941: 63.

Holotype ♀, NEW ZEALAND (USNM) [not examined].

Thrips (Isothrips) obscuratus (Crawford), Sakimura, 1967b: 433.

♀ Medium; uniformly pale to dark brown.

Antennae 7- or 8-segmented; ocellar setae III situated outside ocellar triangle (Fig. 80). Metanotal campaniform sensilla present; sculpture striate; median setae situated at or near anterior margin (Fig. 101). Forewing first vein usually with a complete row of setae, sometimes irregular, sometimes micropterous; scale with 5 setae, apical seta longer than subapical. Abdominal sternites III–VII with 6–14 discal setae; sternite II with 3 pairs of posteromarginal setae. Pleurotergites with several discal setae. Tergite II with 3 lateral marginal setae; tergite VIII posteromarginal comb complete but sometimes irregular (Fig. 90).

♂ Small, paler yellow brown; sternites III to VII each with a transverse, oval glandular area; tergite VIII posteromarginal comb complete but very short, microtrichia indistinct; tergite IX b1 setae much longer and stouter than b2, bases equidistant.

COMMENTS. This is a very variable species and the most common of all New Zealand species (Mound & Walker, 1982). It is closely related to the other New Zealand species *austellus*, *coprosmae* and *phormiicola* which all share the unusual characteristic of having 3 pairs of posteromarginal setae on sternite II.

BIOLOGY. Very common and highly polyphagous; particularly abundant in the flowers of fruit trees and is probably the New Zealand equivalent of *imiginis* in Australia.

DISTRIBUTION. New Zealand.

MATERIAL EXAMINED. NEW ZEALAND: About 350 ♀, ♂ (BMNH).

***Thrips phormiicola* Mound**

(Figs 81, 100)

Thrips phormiicola Mound, 1978: 620–622.

Holotype ♀, NEW ZEALAND, (NZAC) [not examined].

♀ Medium; uniformly brown or head and thorax paler than abdomen, forewing paler at base, antennal segment III slightly paler.

Antennae 7-segmented; ocellar setae III situated outside ocellar triangle (Fig. 81). Metanotal campaniform sensilla present; sculpture with reticulations medially; median setae situated at or near anterior margin (Fig. 100). Forewing usually micropterous, when fully developed with a complete but sparse row of first vein setae; scale variable, macropterae with 4 setae, apical seta about as long as subapical; abdominal sternites III–VII with 5–7 discal setae, sternite II with 3 pairs of posteromarginal setae. Pleurotergites with 1–3 discal setae. Tergite II with 3 lateral marginal setae; tergite VIII posteromarginal comb complete but often irregular.

♂ Always micropterous, similar to ♀; sternites III to VII each with a transverse glandular area, sometimes also a spot on II; tergite VIII posteromarginal comb complete but microtrichia indistinct; tergite IX b1 setae much longer and stouter than b2, bases closer to b2 than to each other.

COMMENTS. This species is closely related to the other New Zealand species *austellus*, *coprosmae* and *obscuratus* but it has a distinctively long head, typical of species living on grasses or grass-like plants.

BIOLOGY. Found on *Phormium tenax* and *P. cookianum*.

DISTRIBUTION. New Zealand.

MATERIAL EXAMINED. NEW ZEALAND: 10 ♀, 10 ♂ paratypes and about 100 additional ♀, ♂ (BMNH).

Thrips subnudula (Karny)

(Figs 79, 82, 87, 102, 111)

Ramaswamiahiella subnudula Karny, 1926: 208–210. Syntypes ♀, ♂, INDIA (depository unknown) [not examined].

Thrips pandu Ramakrishna Ayyar, 1928: 264. Holotype ♀, INDIA (depository unknown) [synonymised by Bhatti, 1969a: 68] [not examined].

Thrips setosus Moulton, 1929: 97. Holotype ♀, INDIA (ZSI) [synonymised by Bhatti, 1969a: 69] [not examined].

Thrips subnudula (Karny): Ramakrishna Ayyar, 1934: 4.

Thrips temporatus Bailey, 1951: 19. [replacement name for *T. setosus* Moulton, 1929, preoccupied by *Thrips setosus* Moulton, 1928].

♀ Small; uniformly pale yellow, legs pale, wings pale, antennal segments I, II and bases of III and IV pale.

Antennae 7-segmented; all head setae small;

ocellar setae III situated within the ocellar triangle (fig. 79). Pronotum with numerous small discal setae; posteroangular setae short; 5 pairs of posteromarginal setae (Fig. 79). Metanotal campaniform sensilla present; sculpture of elongate reticulations; median setae short and situated far behind anterior margin (Fig. 102). Forewing first vein with 7 basal and 3 distal setae; scale with 5–7 setae separated into two groups, 3 and 4, apical seta longer than subapical. Abdominal sternites III–VII with 24–30 long discal setae, sternite II also with 2 or 3 discals, with 6–7 pairs of posteromarginal setae (fig. 82). Pleurotergites with 3–5 discal setae. Tergite II with 3 lateral marginal setae; tergite VIII posteromarginal comb absent medially (Fig. 87).

♂ Similar to ♀; sternites III to VII each with a narrow, transverse glandular area; tergite VIII posteromarginal comb complete but irregular, microtrichia indistinct; tergite IX b1 and b2 setae almost equal in length, b2 displaced laterally, b1 much closer to each other than to b2 (Fig. 111).

COMMENTS. This species is most similar to *imuginis*, which is usually darker yellow to brown with a slightly more distinctly reticulate metanotal sculpture, fewer pronotal discal setae and only 3–4 pairs of sternal posteromarginals. It also shares some characteristics with the new species *facetus* from Malaya. *T. unispinus* is similar but does not have pleurotergal discal setae and is therefore not included in the same group. It also has only 4–5 pairs of sternal posteromarginal setae and 1 pair of long pronotal posteroangulars, the outer pair being little longer than the discals. As is mentioned in the introduction to groups (p. 8) and under *imuginis*, 1 ♀ from Tanah Rata and 1 ♀ from Taiwan (SO) have been examined which are identical to *subnudula* except that they have pale yellow antennae with brown only at the apices of segments IV–VI, the metanotum is more polygonally reticulate medially and neither pair of pronotal posteroangular setae is long.

Although *subnudula* was transferred back to *Ramaswamiahiella* by Bhatti (1969a) because it has 6–7 pairs of sternal posteromarginal setae, it is included here because of its similarities with *Thrips imuginis*, *T. unispinus*, the 2 ♀ discussed above and the undescribed 'species' discussed under *imuginis* (see also Table 3 and introduction to groups). Not only is *subnudula* the type species of *Ramaswamiahiella* but the only other species described in the genus, *kallarensis* Ananthakrishnan, was synonymised with *T. tabaci* by Bhatti, 1980. The character states exhibited by the species included in Table 3 must therefore

cast doubt on the validity of *Ramaswamihiella* as a distinct genus. *T. subnudula* has now been studied from Bali I. in Indonesia and from Nigeria. It has recently been found also in the Philippines and its distribution will no doubt prove to be far wider.

BIOLOGY. Found in flowers of a wide variety of plants.

DISTRIBUTION. Pakistan, India, Bali, Philippines, Nigeria, Uganda.

MATERIAL EXAMINED. PAKISTAN: 7 ♀ (BMNH). INDIA: 5 ♀, 1 ♂ (BMNH). BALI: 4 ♀ (SO). NIGERIA: 2 ♀ (BMNH).

Thrips vulgatissimus Haliday

(Fig. 109)

Thrips vulgatissimus Haliday, 1836: 447–448.

Syntypes ♀, ♂, BRITAIN (depository unknown) [not examined].

♀ Medium to large; dark brown, forewings pale or dusky, antennal segment III pale.

Antennae 8-segmented; ocellar setae III situated outside ocellar triangle. Metanotal campaniform sensilla present; sculpture striate; median setae situated behind anterior margin (cf. Fig. 101). Forewing first vein with 7 basal and 3 distal setae; scale with 5 setae, apical seta more or less equal to subapical. Abdominal sternites III–VII with 8–16 discal setae, sternite II sometimes with 1 or 2. Pleurotergites with 1–4 discal setae. Tergite II with 3 lateral marginal setae; tergite VIII posteromarginal comb complete, long and regular.

♂ Smaller, pale brown, similar to ♀; sternites III to VII each with an oval, transverse glandular area; tergite VIII posteromarginal comb absent or with a few very short microtrichia; tergite IX b1 and b2 setae very long and almost equal in length, b2 situated posterior to b1 (Fig. 109).

COMMENTS. This species is closely related to the other mainly European species *meridionalis* and is also similar in appearance to the commonest New Zealand species *obscuratus*, which differs in having entirely brown antennae, forewing first vein with a complete row of setae, shorter major pronotal setae, longer median metanotal setae, sternite II with 3 pairs of posteromarginal setae and posteromarginal comb on tergite VIII often more irregular.

T. vulgatissimus may also be confused with *alliorum* which is very common on onions from Taiwan to Hawaii and which differs in having postocular setae II displaced behind the row,

fewer pleurotergal discal setae and a very short or almost absent posteromarginal comb on tergite VIII.

BIOLOGY. Very common on a wide variety of plants, particularly those with white flowers.

DISTRIBUTION. This is really a European and North American species but it has been recorded from China and New Zealand.

MATERIAL EXAMINED. About 200 ♂, ♀, mostly European. CHINA: 1 ♀ (BMNH). NEW ZEALAND: 3 ♀ (BMNH).

Group V

This is the largest and most homogeneous group in the Oriental and Pacific Regions, and is characterised by the presence of discal setae on sternites II or III to VII, but the absence of discal setae on the pleurotergites. The majority of species have ocellar setae III situated outside the ocellar triangle; metanotal campaniform sensilla present, more or less striate sculpture, and median setae at or near anterior margin; tergite VIII with complete posteromarginal comb; forewing first vein usually with 7 basal and 3 distal setae.

Within group V there is a group of species that have the comb on tergite VIII absent medially: *gardeniae*, *vitticornis* and *kotoshoi* have closely striate metanotal sculpture; *longicaudatus*, *leuweni* and n.sp. Reyes (in press) have reticulate sculpture. *T. unispinus* also has an incomplete comb and reticulate metanotal sculpture but is otherwise morphologically dissimilar and not related. All other species in the group have a complete comb on tergite VIII.

Of these species with a complete comb, two, *simplex* and *emulatus*, have ocellar setae III situated within the ocellar triangle and more or less reticulate metanotal sculpture; three, *T. tristis*, *brevistylus* and *pavettae*, share a tendency for the median metanotal setae to be situated unusually close together and have striate metanotal sculpture; and the majority of the remainder fall into two large groups of common and variable species which are often difficult to distinguish.

Members of the *sumatrensis* group, comprising *cinchonae*, *samoensis*, *sumatrensis* and *wedeliae*, and possibly *fulmeki*, have numerous setae on the forewing first vein, at least 10 basal setae and sometimes an almost complete row. They are a group of remarkably similar species, from the Pacific Islands, differing only in small variations of structure and colour.

The *hawaiiensis* group, containing probably

Table 2 An estimate, partly from literature, of the total number of *Thrips* species, the number of endemic species and the distribution of the more widespread species (X) within the 5 species groups in the 8 geographical regions of the world. NT = Neotropical, NA = Nearctic, PA = Palaearctic, AT = Afrotropical, Or = Oriental, AO = Austro-Oriental, Au = Australian, Pa = Pacific.

	NT	NA	PA	AT	Or	AO	Au	Pa
Group I	0	0	0	0	2	5	4	0
8 endemic species	–	–	–	–	1	4	3	–
<i>malloti</i>	–	–	–	–	X	X	X	–
Group II	2	46	40	4	20	9	5	10
99 endemic species	–	38	32	1	16	5	1	6
<i>albopilosus</i>	–	X	X	–	–	–	–	–
<i>discolor</i>	–	X	X	–	–	–	–	–
<i>flavus</i>	–	X	X	–	X	X	X	X
<i>fuscipennis</i>	–	X	X	–	–	–	–	–
<i>herricki</i>	–	X	X	–	–	–	–	–
<i>nigropilosus</i>	–	X	X	X	X	X	X	X
<i>palmi</i>	X	–	–	X	X	X	X	X
<i>tabaci</i>	X	X	X	X	X	X	X	X
<i>validus</i>	–	X	X	–	–	–	–	–
Group III	1	0	0	0	4	6	1	1
3 endemic species	–	–	–	–	–	2	1	–
<i>extensicornis</i>	–	–	–	–	X	X	–	–
<i>orientalis</i>	X	–	–	–	X	X	–	X
<i>parvispinus</i>	–	–	–	–	X	X	X	–
<i>taiwanus</i>	–	–	–	–	X	X	–	–
Group IV	2	5	10	10	10	5	3	7
22 endemic species	–	2	6	7	2	–	1	4
<i>alliorum</i>	X	–	–	–	X	–	–	X
<i>apicatus</i>	–	–	–	–	X	X	–	–
<i>atratus</i>	–	X	X	–	–	–	–	–
<i>australis</i>	X	X	X	X	X	X	X	X
<i>facetus</i>	–	–	–	–	X	X	–	–
<i>imaginis</i>	–	–	–	–	X	X	X	–
<i>meridionalis</i>	–	–	X	X	X	–	–	–
<i>subnudula</i>	–	–	–	X	X	X	–	–
<i>vulgatissimus</i>	–	X	X	–	X	–	–	X
Group V	3	6	10	14	14	20	8	9
40 endemic species	–	3	8	13	4	9	–	3
<i>calcaratus</i>	–	X	X	–	–	–	–	–
<i>coloratus</i>	–	–	–	–	X	X	X	–
<i>emulatus</i>	–	–	–	–	X	X	–	–
<i>florum</i>	X	–	–	–	X	X	X	X
<i>hawaiiensis</i>	X	X	–	–	X	X	X	X
<i>kotoshoi</i>	–	–	–	–	X	–	–	X
<i>longicaudatus</i>	–	–	–	–	–	X	X	X
<i>melastomae</i>	–	–	–	–	X	X	–	–
<i>simplex</i>	X	X	X	X	X	X	X	X
<i>sumatrensis</i>	–	–	–	–	X	X	X	–
<i>unispinus</i>	–	–	–	–	–	X	X	–
<i>vitticornis</i>	–	–	–	–	X	X	X	X
<i>wedeliae</i>	–	–	–	–	X	X	–	–

the most common pest species of the region, comprises *aleuritidis*, *andrewsi*, *coloratus*, *florum*, *hawaiiensis*, *melastomae*, *unonae*, possibly *griseus*, *hispidus* and a number of other undescribed forms that may represent species. They usually have only 7 or 8 basal first vein setae. Both these

groups of species show a very confusing degree of variation which is discussed under *wedeliae* and *hawaiiensis*, and species in these two groups are very similar to each other. A series of 12 ♀, 4 ♂ of an undescribed 'species' from *Adinandra dumosa* in Singapore (BMNH) appears to differ from the *sumatrensis* group only in having 7–8 basal forewing first vein setae and 3 distal. They have 8-segmented antennae and would therefore be most similar to *samoensis*.

The remaining species, *T. unispinus*, shows some similarities to *imaginis* and its relatives in group IV (see Table 3).

Thrips aleuritidis Moulton & Steinweden

(Fig. 113)

Thrips aleuritidis Moulton & Steinweden, 1933: 29–31. Holotype ♀ TAHITI (BPBM) [examined].

♀ Medium to small; uniformly dark brown, tibiae slightly paler, antennal segment III and sometimes base of IV pale.

Antennae 7-segmented; ocellar setae III situated outside ocellar triangle (Fig. 113). Metanotal campaniform sensilla present; sculpture broadly striate with some reticulations medially; median setae at anterior margin. Forewing first vein with 7 basal and 3–4 distal setae; scale with 5 marginal setae, apical longer than subapical. Abdominal sternites III–VII with about 10 discal setae. Tergite II with 3 lateral marginal setae, 4 displaced onto pleurite; tergite VIII posteromarginal comb complete but microtrichia short and irregular.

♂ Small, yellow with dark wings similar to ♀; sternites III to VII each with a narrow, transverse glandular area; tergite VIII posteromarginal comb absent or of a few very short microtrichia; tergite IX b1 setae longer than b2 and slightly closer to b2 than to each other.

COMMENTS. Structurally this species belongs to the *hawaiiensis* group but differs from the rest of that group in having uniformly dark forewings. It also differs from *andrewsi* in having long median postocular setae I and from *florum* in having long postocular setae II.

BIOLOGY. Has been found on *Aleurites*, *Lantana*, *Dodonaea* and *Psidium guava*.

DISTRIBUTION. Tahiti in the Society Islands.

MATERIAL EXAMINED. SOCIETY IS: Tahiti, Holotype ♀ (BPBM); 19 ♀, 2 ♂ (BMNH).

Table 3 Character states which confuse relationships between species and species groups.

A. Group V <i>unispinus</i>					
B. Group V undescribed sp.n. (BMNH)					
C. Group IV <i>imuginis</i>					
D. Group IV <i>subnudula</i>					
E. Group IV undescribed sp.n. (SO)					
	A	B	C	D	E
Postocular setae II					
small	X	—	—	—	—
large	—	X	X	X	X
Pronotal striations					
fine	—	X	—	—	—
broad	X	—	X	X	X
Pronotal discal setae					
few	—	X	X	—	—
numerous	X	—	—	X	X
Pronotal posteromarginal setae	3	4(3–5)	5(4)	5	5
Outer posteroangular setae:					
Inner posteroangular setae	2.0	1.0	1.0	1.0	small
Metanotal reticulations					
broad	X	—	X	—	X
elongate	—	X	—	X	—
Pleurotergal discal setae	0	0	2	4–5	5–7
Tergite VIII posteromarginal comb					
present medially	C	—	—	—	C
absent medially	—	X	X	X	—
Sternite V					
discal setae	15–20	15–25	15–25	24–30	20–28
posteromarginal setae	6–10	6–8	6–8	12–14	10–14
C = craspedum					

***Thrips andrewsi* (Bagnall)**

(Figs 112, 130)

Physothrips andrewsi Bagnall, 1921: 394–395.

Lectotype ♀, INDIA (BMNH) [designated by Mound, 1968: 53] [examined].

Thrips andrewsi (Bagnall); Bhatti, 1978: 191.

♀ Medium; uniformly dark brown, wings dark with base pale, antennal segment III and sometimes base of IV pale.

Antennae 8-segmented; ocellar setae III situated outside ocellar triangle (Fig. 112). Metanotal campaniform sensilla present; sculpture striate with a few poorly formed reticulations medially; median setae situated at anterior margin (Fig. 130). forewing first vein with 7 basal and 3 distal setae; scale with 5 setae, apical equal in length to subapical or slightly shorter. Abdominal sternites III–VII with 10–12 discal setae, 2–3 on sternite II. Pleurotergites without discal setae. Tergite VIII posteromarginal comb complete and regular.

♂ Abdominal sternites III–VII each with a large, transverse glandular area; tergite VIII posteromarginal comb absent; tergite IX b1 setae

closer to b2 than to each other and almost twice as long.

COMMENTS. This species appears to be related to *florum* but postocular setae I are not enlarged, II not particularly small, and the metanotal sculpture is more closely striate. In the BMNH 4 ♀ have been examined which may represent *andrewsi*. They differ, however, in having 8–9 basal forewing first vein setae, a more irregular comb and a certain cuticular granular appearance particularly on the head. They also share some characteristics of *viiticornis*: striate metanotal sculpture and more numerous forewing first vein setae but this species is smaller, has shorter antennal segments and tergite VIII posteromarginal comb absent medially. Two of these females are from canopy fogging in Brunei and 2 ♀, slightly larger, with a more closely striate metanotal sculpture and longer pronotal posteroangular setae, are from a pitfall trap in Sarawak. One of these last two females also has ocellar setae III situated within the ocellar triangle.

BIOLOGY. May have a preference for tea flowers.

DISTRIBUTION. India, China.

MATERIAL EXAMINED. INDIA: Lectotype ♀, 1 ♀ paratype, 20 ♀, 30 ♂ (BMNH), CHINA: 2 ♀ (BMNH).

Thrips arorai Bhatti

Thrips arorai Bhatti, 1980: 124–126. Holotype ♀, INDIA (JSB) [not examined].

DESCRIPTION. Bhatti, 1980: 124–126; illustrations p. 148.

COMMENTS. Dark brown species with banded wings and 7-segmented antennae. It does not appear to be closely related to any other species.

BIOLOGY. Known from only 2 ♀ collected on fern.

DISTRIBUTION. India.

MATERIAL EXAMINED. None.

Thrips brevistylus (Priesner)

(Figs 115, 132)

Taeniothrips brevistylus Priesner, 1938: 496. Holotype ♀, JAVA (SMF) [examined].

Thrips brevistylus (Priesner): Bhatti, 1978: 191.

♀ Medium to large; uniformly brown, wings dark, legs dark, antennae dark with pale III.

Antennae 8-segmented, ocellar setae III situated outside ocellar triangle (Fig. 115). Metanotal campaniform sensilla present; sculpture striate; median setae situated at anterior margin and very close together (Fig. 132). Forewing first vein with 7 basal and 3 distal setae; scale with 5 setae, apical shorter than subapical. Abdominal sternites III–VII with about 10 discal setae, 2–3 on sternite II. Pleurotergites without discal setae. Tergite II with 4 lateral marginal setae; tergite VIII posteromarginal comb complete but often irregular.

♂ Recorded for the first time from the Philippines (Reyes, in press).

COMMENTS. This species is closely related to *pavettae* from Sumatra and Java, differing mainly in the proximity of the median metanotal setae.

BIOLOGY. Unknown.

DISTRIBUTION. Java, Philippines.

MATERIAL EXAMINED. JAVA: Holotype ♀ (SMF). PHILIPPINES: 1 ♀, 1 ♂ (Reyes).

Thrips cinchonae Priesner

(Figs 114, 133, 144)

Thrips sumatrensis var. *cinchonae* Priesner, 1934: 256–257. Holotype ♀, JAVA (SMF) [examined].

Thrips cinchonae Priesner: Sakimura, 1967b: 435.

♀ Small to medium; uniformly brown.

Antennae 7-segmented; ocellar setae III situated outside ocellar triangle (Fig. 114). Metanotal campaniform sensilla present; sculpture striate; median setae situated at anterior margin (Fig. 133). Forewing first vein with numerous setae, about 15 basal and 2 distal; scale with 5 setae, apical seta longer than subapical. Abdominal sternites III–VII with about 8 discal setae, 1 on sternite II. Pleurotergites without discal setae. Tergite II with 4 lateral marginal setae; tergite VIII posteromarginal comb complete and regular (Fig. 144).

♂ Unknown.

COMMENTS. This species is known only from the unique holotype, which is poorly preserved. It is closely related to *samoensis*, *wedeliae* and *sumatrensis*. All four are very difficult to distinguish. However, *cinchonae* has a comb which appears to have longer, finer and more regular microtrichia, antennal segments darker and sternal discal setae fewer than the other 3 species.

BIOLOGY. *Cinchona* flowers.

DISTRIBUTION. Java.

MATERIAL EXAMINED. JAVA. Holotype ♀ (SMF).

Thrips coloratus Schmutz

Thrips colorata Schmutz, 1913: 1013–1015. Syn-types ♀, SRI LANKA (NHM) [not examined].

Thrips japonicus Bagnall, 1914: 288. Lectotype ♀, JAPAN [designated and synonymised by Mound, 1968: 62] (BMNH) [examined].

Thrips melanurus Bagnall, 1926: 111–112. Holotype ♀, INDIA (BMNH) [synonymised by Mound, 1968: 62] [examined].

Thrips aligherini Girault, 1927: 1. Syntypes ♀ QUEENSLAND (QM) [synonymised by Mound & Houston, 1987: 9 [examined].

Thrips coloratus coloratus Schmutz: Bhatti, 1980: 131.

Thrips coloratus japonicus Bagnall: Bhatti, 1980: 131.

♀ Small to medium; very variable, pale yellow to

brown. The majority of specimens are pale yellow with antennal segments VII, VI & IV and apex of V brown; dark median patches on abdominal tergites; most of IX and X entirely brown. The nominal species that exhibit this colouring are *coloratus* ssp. *coloratus*, *melanurus* and *aligherini*.

Palest specimens are uniformly pale yellow with antennal segments VII, VI and apex of V & IV brown, also tip of abdomen, at least most of tergite X brown.

Darkest specimens (*japonicus*) are more extensively pale brown; forewings dusky; antennal segment II darker than I & III, IV–VII entirely brown; abdominal tergites mostly brown, paler laterally, IX & X brown.

Antennae 7-segmented; ocellar setae III situated outside ocellar triangle. Metanotal campaniform sensilla present; sculpture broadly striate; median setae situated just behind anterior margin. Forewing first vein with 7 basal and 3 distal setae; scale with 5 setae, apical longer than subapical. Abdominal sternites III–VII with 15–25 discal setae, 3–4 on sternite II. Pleurotergites without discal setae. Tergite II with 4 lateral setae; tergite VIII postermarginal comb complete but irregular.

♂ Described for the first time by Bhatti (1980: 131); small, yellow. Sternites III to VII each with a transverse glandular area; tergite VIII postermarginal comb absent, tergite IX b1 setae slightly longer than b2 and far apart, very close to b2.

COMMENTS. This is a very common and very variable species. Antennal segments IV & V may be dark or bicoloured and the median metanotal setae are usually behind the anterior margin but sometimes very close to it. Javanese specimens examined are entirely pale yellow; the majority from India, Laos, China etc. have a darker median spot on abdominal tergites; Japanese specimens are darkest with tergites mostly brown. This species is morphologically most similar to *hawaiiensis* and *florum* but it differs from these in colour and position of metanotal setae. It has more numerous discal setae on sternite VII than *florum* and the comb is possibly a little sparser, longer and finer but no less irregular.

Bhatti (1980) appears to support the retention of two subspecies, *coloratus* for the paler specimens including *melanurus* and *aligherini*, and *japonicus* for the darkest.

A series of 5 ♂, 5 ♀ from dead branches on the Ogasawara Islands, Japan (SO) has been examined. The specimens are almost entirely dark brown with paler tibiae and antennal seg-

ment III. The males are also brown. They appear most similar to *florum* but sternal discal setae are too numerous. The position of the median metanotal setae is distinctly behind the anterior margin and for this reason alone they are included in *coloratus*.

BIOLOGY. Polyphagous, flower-living.

DISTRIBUTION. Pakistan, India, Ceylon, Thailand, Laos, China, Taiwan, Japan, Malaya, Celebes, Java, Philippines, Brunei, New Guinea, Queensland.

MATERIAL EXAMINED. The Girault collection (QM) contains 2 slides with a total of 8 specimens fitting the description of *aligherini*. One slide labelled '*Physothrips mjobergi* Karny' (1 ♀)/ *Thrips aligerini*/Gir. Cotype ♀s '(3♀)/Castor Oil flowers/Brisbane 16 Feb. 1927/Ex *Ricinus communis* Linn.' The other slide labelled '*Thrips aligerini* girault/Type ♀' (5 ♀ completely visible). 'Wynnum, Q/forest/*Trichoth. erinaceus*' (2 ♀ under separate cover slip). 'Inner:/ *Physothrips/mjobergi*/Karny' (1 ♀). All 8 ♀ are here regarded as syntypes.

PAKISTAN: 32 ♀. INDIA: Holotype ♀ of *melanurus*. THAILAND: 2 ♀. LAOS: 6 ♀. CHINA: 2 ♀ (BMNH). TAIWAN: 2 ♀ (SO). JAPAN: lectotype ♀, 1 ♀ paralectotype of *japonicus*, 8 ♀ (BMNH), 3 ♀ (SO). MALAYA: 3 ♀. JAVA: 19 ♀. BRUNEI: 1 ♀ (BMNH). CELEBES: 1 ♀ (SO). AUSTRALIA: 8 ♀ syntypes of *aligherini* (QM), 2 ♀ (BMNH).

DOUBTFULLY ASSOCIATED MATERIAL. JAPAN: 5 ♀, 5 ♂ (SO).

Thrips emulatus Ananthakrishnan

Thrips brunneus Ananthakrishnan & Jagadish, 1968: 359–360. Holotype ♀, INDIA (TNA) [not examined].

Thrips emulatus Ananthakrishnan in Kudô, 1979: 492. [new name for *T. brunneus*, preoccupied by *Thrips brunneus* Ishida].

DESCRIPTION. Redescribed in Bhatti (1980: 127–128).

COMMENTS. Yellow species with 7-segmented antennae and outer pronotal posteroangular setae about half as long as inner posteroangulars.

BIOLOGY. Described from leaves of *Cynanchum alatum*, also known from white legume flowers, Jasmine and *Adhadota* in India, Euphorbiaceae in S.W. Africa.

DISTRIBUTION. India, S.W. Africa.

MATERIAL EXAMINED. None.

Thrips florum Schmutz

(Fig. 121)

Thrips florum Schmutz, 1913: 1003–1004. Syn-types ♀, SRI LANKA (depository unknown) [not examined].

Full synonymy given by Nakahara (1985).

♀ Medium; uniformly brown; antennal segment III, sometimes base IV pale.

Antennae usually 7- rarely 8-segmented; ocellar setae III situated outside ocellar triangle; postocular seta II minute, much smaller than I or III (Fig. 121). Metanotal campaniform sensilla present; sculpture striate; median setae situated at anterior margin. Forewing first vein with 7 basal and 3 distal setae; scale with 5 setae, apical seta more or less equal to subapical. Abdominal sternites III–VII with 6–14 discal setae, 1–2 on sternite II. Pleurotergites without discal setae. Tergite II with 4 lateral marginal setae; tergite VIII posteromarginal comb complete but irregular.

♂ Small, pale brown, similar to ♀; sternites III to VII each with a narrow transverse glandular area; tergite VIII posteromarginal comb absent or indistinct; tergite IX b1 setae longer than b2, bases much closer to b2 than to each other.

COMMENTS. Inter- and intraspecific variation in the *hawaiiensis* group causes problems in distinguishing between the species (Nakahara, 1985; Palmer & Wetton, 1987). *T. florum* is particularly similar to the brown forms of *hawaiiensis* and *coloratus*, *unonae*, *andrewsi* and two undescribed 'species', one from Singapore, and the other from Sarawak and Brunei (BMNH). There are also about 50 ♀, ♂ in BMNH from localities throughout the eastern Oriental Region that cannot be assigned to any of these species.

BIOLOGY. Polyphagous, common in flowers of many species but not known to cause damage.

DISTRIBUTION. India, Ceylon, Burma, Thailand, Malaya, Singapore, Brunei, Sarawak, Bali, Celebes, New Guinea, New Hebrides, Java, Taiwan, Tahiti, Samoa, Fiji, Torres Strait, Philippines, Solomon Is, Hawaii.

MATERIAL EXAMINED. About 50 ♂, ♀ from India, Malaya, Singapore, Brunei, Sarawak, Bali, Celebes, New Guinea, New Hebrides, Java, Taiwan, Torres Strait, Philippines, Solomon Is, (BMNH), 12 ♀ from Malaya, Bali, Taiwan and Celebes (SO).

Thrips fulmeki (Priesner)

Taeniothrips fulmeki Priesner, 1938: 497–498.

Holotype ♀, SUMATRA (SMF) [examined].

Thrips fulmeki (Priesner): Bhatti, 1978: 191.

The holotype, the only specimen of the species known, is mounted laterally and therefore characteristics are difficult to observe.

♀ Medium to large; uniformly dark brown, antennal segment III and possibly forewing base paler.

Antennae 8-segmented; ocellar setae appear to be outside ocellar triangle. Metanotal campaniform sensilla not visible; sculpture closely striate; median setae situated probably at anterior margin. Forewing first vein with an almost complete row of setae, 14 basal and 2 distal; scale with 5 setae, apical shorter than subapical. Abdominal sternites III–VII with discal setae, 1–2 on sternite II. Pleurotergites without discal setae. Tergite II with 4 lateral marginal setae; tergite VIII posteromarginal comb complete.

♂ Unknown.

COMMENTS. This species is most closely related and similar to *samoensis* in colour and 8-segmented antennae but it is much larger, has a few more forewing first vein setae and more closely striate metanotal sculpture. Other species in the group have either 7-segmented antennae or paler antennal segments IV & V, or both. It is also morphologically similar to *vitticornis* which differs in having 3–6 distal forewing first vein setae and tergite VIII posteromarginal comb absent medially.

BIOLOGY. Unknown.

DISTRIBUTION. Sumatra.

MATERIAL EXAMINED. SUMATRA: Holotype ♀ (SMF).

Thrips gardeniae sp.n.

(Figs 123, 134, 143, 145)

♀ Macroptera. Large; colour uniformly dark brown, legs pale with dark shading on hind femora; head paler between eyes; antennal segment III, base IV & V pale; forewings pale at base; major body setae dark.

Antennae 8-segmented, segments long and narrow (Fig. 143); ocellar setae III situated outside ocellar triangle; postocular setae I well developed, sometimes almost as long as ocellar setae III; postocular setae II small and situated behind pair I, posterior to the row (Fig. 123). Pronotum finely striate; with 3 pairs of postero-

marginal setae; anteroangular and midlateral setae well developed (Fig. 123). Metanotal campaniform sensilla present; sculpture very closely striate; median setae situated a little behind anterior margin and very long, reaching almost to posterior margin (Fig. 134). Forewing first vein with an almost complete row of setae, the gap between apical setae being the largest; scale with 5 marginal setae, subapical seta larger than apical. Abdominal sternites with 3 pairs of posteromarginal setae (2 on sternite II); sternites II or III–VII with discal setae, 0–3 on II, 9–14 on V, 8–11 on VII. Pleurotergites without discal setae. Tergite II with 4 lateral setae. Tergite VIII posteromarginal comb of short, irregular microtrichia laterally, absent medially (Fig. 145).

Measurements (♀ Holotype in μm). Body length 2045. Ocellar setae III 68. Postocular setae I 58/62; II 15; III 30. Pronotal posteroangular setae, inner 120; outer 124. Median metanotal setae 86/88.

♂ Macroptera. Colour uniformly pale, yellow, antennal segments VIII–VI, apices of V & IV and body setae dark.

Structure similar to ♀; abdominal sternites II or III–VIII with 5–10 discal setae, III–VII each with a very large, transverse glandular area. Tergite VIII posteromarginal comb absent; tergite IX b1 setae about twice as long as b2, their bases almost equidistant.

Measurements (♂ paratype in μm). Body length 1425. Ocellar setae III 50. Postocular setae I 45; II 12; III 22. Pronotal posteroangular setae, inner 98/105; outer 105. Median metanotal setae 72. Sternite V glandular area, breadth 120; median length 24. Tergite IX b1 setae length 58/60, distance between bases 12; b2 setae length 28/30, distance between bases 38.

COMMENTS. This is a distinctively large, dark brown species with pale legs. It is most similar in appearance to the widespread species *vitticornis* but easily distinguished from it by the complete row of forewing first vein setae and large postocular seta I.

BIOLOGY. Associated with *Gardenia* flowers.

DISTRIBUTION. New Guinea, Solomon Islands.

MATERIAL EXAMINED. Holotype ♀. NEW GUINEA; west Highland Province, Mt Hagan, Kuk Agricultural Research Institute, in *Gardenia* flowers, 24.x.1980, (B.M. Thistleton KK4436) (BMNH). Paratypes. 16 ♀, 1 ♂ same data as holotype (1 ♀ CAS 4 ♀, SMF). SOLOMON ISLANDS: Gizo I., 4 ♀, 6.xii.1980, (N.L.H. Krauss) (SMF T10020) (1 ♀ BMNH).

Thrips griseus Bagnall

Thrips griseus Bagnall, 1916b: 403. Lectotype ♀, JAPAN (BMNH) [designated by Mound, 1968: 65] [examined].

♀ Small to medium; uniformly brown, legs brown, wings dark, antennal segments III & IV paler at base.

Antennae 7-segmented; ocellar setae situated outside ocellar triangle, near anterior margins, postocular seta I small. Metanotum with striate sculpture; campaniform sensilla not apparent; median setae behind anterior margin. Forewing first vein with 7 basal and 3–4 distal setae; scale with 5 setae, apical seta longer than subapical. Abdominal sternites III–VII with 8–10 discal setae, none on sternite II. Pleurotergites without discal setae. Tergite II with 3 lateral setae, 4th seta sometimes on pleurite, tergite VIII posteromarginal comb complete but microtrichia short and irregular.

♂ Unknown.

COMMENTS. This species belongs to the *hawaiiensis* group and is most similar to *aleuritis* and *coloratus*, and *hispidus* from India which differs mainly in having paler tibiae and antennae, well developed median postocular setae and more numerous pronotal and sternal discal setae which are also present on sternite II. Most species in this group, however, usually have the median metanotal setae on or near the anterior margin and antennal segment III pale, IV dark. *T. coloratus* is also usually a paler species with a longer, finer comb, although the form *japonicus* from Japan is mostly brown.

BIOLOGY. Has been found on *Cirsium japonicum*. The six specimens from Pakistan were found on *Taraxacum officinale*. Miyazaki & Kudô (1988) list also *Trifolium*, *Nicotiana* and *Thea*.

DISTRIBUTION. Japan.

MATERIAL EXAMINED. JAPAN: Lectotype ♀ (BMNH). 4 ♀ (Saki.).

DOUBTFULLY ASSOCIATED MATERIAL. PAKISTAN: 4 ♀, 2 ♂ (BMNH).

Thrips hawaiiensis (Morgan)

(Figs 120, 135)

Thrips hawaiiensis Morgan, 1913: 3–5. Lectotype ♀, HAWAII (USNM) [designated by Nakahara, 1985: 868] [not examined].

Full synonymy given in Nakahara (1985).

♀ Medium; brown or bicoloured with head and thorax orange-yellow, abdomen brown, antennae dark, segment III pale.

Antennae 7- or 8-segmented; ocellar setae III situated outside ocellar triangle; postocular setae I & II well developed and subequal (Fig. 120). Metanotal campaniform sensilla present; sculpture broadly striate; median setae at anterior margin (Fig. 135). Forewing first vein with 7 basal and 3 distal setae; scale with 5 setae, apical seta longer than subapical. Abdominal sternites III–VII with 12–25 discal setae, 1–2 on sternite II. Pleurotergites without discal setae. Tergite II with 4 lateral marginal setae; tergite VIII posteromarginal comb complete but microtrichia often short and irregular.

♂ Small, pale yellow-brown; sternites III to VII each with a narrow glandular area; tergite VIII posteromarginal comb absent or indistinct; tergite IX b1 slightly longer than b2 and equidistant.

COMMENTS. This is a very common, widespread and variable species (Nakahara, 1985; Palmer & Wetton, 1987). The bicoloured form is more easily recognised. It usually has 7-segmented antennae and is often associated with bananas. Pale specimens may be confused with typical *coloratus* and dark forms with *florum*, the *japonicus* form of *coloratus* or *unonae*. They often have 8-segmented antennae, however, which distinguishes them from *unonae* and most *florum*. *T. hawaiiensis* and *florum* have been synonymised in the past, which now confuses distributional and biological information. Nakahara (1985), however, clearly segregates the synonymies of both species. 38 ♀, 9 ♂ (SMF) have been examined, from Tahiti, Tubuai, Solomon Islands, Guadalcanal and Gizo, and New Hebrides that belong to the *hawaiiensis* group. They differ from all previously described species but, because of the degree of variation exhibited by a number of characteristics, they are not described here. Antennal segments IV & V may be brown or bicoloured; postocular setae I large, II small, III large or small; median metanotal setae at or behind anterior margin; metanotal sculpture closely striate, arcuate anteriorly or closely striate, converging posteriorly or with broader striations either converging or not, and less arcuate. Samples from Tahiti and Tubuai are most commonly with brown antennal segments IV & V, small postocular setae III and converging metanotal sculpture. Those from Gizo usually have bicoloured antennal segments IV & V, well developed postocular setae III and closely striate metanotal sculpture. 7 ♀ from the New

Hebrides are much darker with brown tibiae, darker wings, dark antennae except segment III and small postocular setae I. The variation, therefore, tends to be between, rather than within, populations but it is not possible to know, at present, whether it is also interspecific. There are also more than 50 specimens (BMNH) from throughout the distribution range of the *hawaiiensis* species group that are not, at present, assignable to any one species.

BIOLOGY. May be found in flowers of many species, is often associated with bananas and has been used as an oil palm pollinator. It causes damage to roses in Georgia, U.S.A.; *Citrus* in India; coffee and mangoes in Thailand; bananas in Australia.

DISTRIBUTION. Throughout the area of study from Pakistan to Korea, Hawaii and New Zealand, around the southern and eastern U.S.A. from the District of Columbia to California, Queensland and Northern Territories of Australia (Palmer & Wetton, 1987).

MATERIAL EXAMINED. More than 200 ♀, ♂ including types of *albipes* and *pallipes* from JAPAN and *versicolor* from FIJI (BMNH), 32 ♀, 2 ♂ from Japan, Taiwan and Thailand (SO).

DOUBTFULLY ASSOCIATED MATERIAL. About 50 ♀ mostly from Malaya, Java, Solomon Is, New Hebrides, New Guinea (BMNH).

Thrips hispidus Ananthakrishnan & Jagadish

Thrips hispidus Ananthakrishnan & Jagadish, 1966: 88–89. Syntypes ♀, INDIA (TNA) [examined].

DESCRIPTION. Ananthakrishnan & Jagadish (1966: 88–89).

COMMENTS. Dark brown species with dark forewings, paler tibiae and antennal segments III–VI. Antennae 7-segmented. It is morphologically most similar to *griseus* from Japan and is discussed under that species.

BIOLOGY. Has been found in *Lantana* and *Acacia* flowers; also *Rosa* and *Dahlia*.

DISTRIBUTION. India.

MATERIAL EXAMINED. INDIA: 2 ♀ with type data (1 labelled holotype) (TNA), 2 ♀ (ZSI).

***Thrips kotoshoi* (Moulton)**

Taeniothrips kotoshoi Moulton, 1928c: 300–301.

Holotype ♀, TAIWAN, (CAS) [examined].

Thrips kotoshoi (Moulton): Bhatti, 1978: 191.

♀ Medium to large; uniformly dark brown, legs dark, wings dark, antennae dark, segment III paler.

Antennae 8-segmented; ocellar setae situated outside ocellar triangle. Metanotal campaniform sensilla present; sculpture closely striate; median setae situated at anterior margin. Forewing first vein with 7 basal and 3 distal setae; scale with 5 setae, apical seta longer than subapical. Abdominal sternites III–VII with 8–12 discal setae. Pleurotergites without discal setae. Tergite II with 4 lateral marginal setae; tergite VIII posteromarginal comb absent medially.

♂ Unknown.

COMMENTS. This species is most closely related and very similar to the more widespread and common species *vitticornis* which differs only in its smaller size and 3–8 distal forewing first vein setae. It is also somewhat similar and more distantly related to *gardeniae* described here from New Guinea and the Solomon Is, but this species has a complete row of forewing first vein setae, pale wing base, bicoloured antennal segments IV & V and much longer postocular setae I.

BIOLOGY. Unknown.

DISTRIBUTION. Taiwan, Fiji.

MATERIAL EXAMINED. TAIWAN: Holotype ♀ (CAS).

***Thrips leeuweni* (Priesner)**

(Figs 116, 136)

Taeniothrips leeuweni Priesner, 1938: 498–499.

Holotype ♀, SINGAPORE (SMF) [examined].

Thrips leeuweni (Priesner): Bhatti, 1978: 191.

♀ Medium; midbrown, legs paler, forewing base paler, antennal segment III paler.

Antennae 7- or 8-segmented; ocellar setae III situated outside ocellar triangle (Fig. 116). Metanotal campaniform sensilla present; sculpture of elongate reticulations medially; median setae at anterior margin (Fig. 136). Forewing first vein with 7 basal and 3 distal setae; scale with 5 setae, apical seta shorter than subapical. Abdominal sternites III–VII with 10–12 discal setae, 2–3 on sternite II. Pleurotergites without discal setae. Tergite II with 4 lateral setae; tergite VIII

posteromarginal comb usually absent medially but sometimes represented by a few irregular small microtrichia.

♂ Unknown.

COMMENTS. This species is morphologically most similar to *longicaudatus* which is larger, has a complete row of forewing first vein setae and is almost without pronotal striations. Species of the *hawaiiensis* group are also similar but these have a complete comb and less reticulate metanotal sculpture.

There are 12 ♀ in the BMNH collection, from Fiji, New Guinea, Solomon Is and Brunei, which are a little larger, have a more polygonally reticulate metanotum and comb definitely absent medially. This is another instance of variation which is difficult to interpret.

BIOLOGY. Known from flowers of Rubiaceae.

DISTRIBUTION. Malaya, Singapore.

MATERIAL EXAMINED. SINGAPORE: Holotype ♀, 2 ♀ paratypes (SMF).

DOUBTFULLY ASSOCIATED MATERIAL. FIJI: 3 ♀. NEW GUINEA: 3 ♀. SOLOMON IS: 1 ♀. BRUNEI: 5 ♀ (BMNH).

***Thrips longicaudatus* (Bianchi)**

(Figs 118, 152)

Thrips longicaudatus Bianchi, 1953: 94–96. Holotype ♀, SAMOA (BPBM) [examined].

Isochaetothrips longicaudatus (Bianchi): Sakimura, 1967c: 725.

Thrips longicaudatus (Bianchi): Bhatti, 1978: 191.

♀ Large; uniformly dark brown, forewing base pale, antennal segment III pale; abdomen extremely long and pointed.

Antennae 8-segmented; ocellar setae III situated outside ocellar triangle (Fig. 118). Pronotum without striations (Fig. 118). Metanotal campaniform sensilla present; sculpture polygonally reticulate medially; median setae situated at anterior margin. forewing first vein with a complete row of setae; scale with 5 setae, apical seta much smaller than subapical. Abdominal sternites III–VII with 8–12 discal setae; 3 on sternite II. Pleurotergites without discal setae. Tergite II with 4 lateral marginal setae; tergite VIII posteromarginal comb often absent medially but sometimes represented by short, irregular microtrichia or small lobes; IX–X unusually long (Fig. 152).

♂ Unknown.

COMMENTS. This species is most similar morphologically but probably not closely related to *leeuweni* which is smaller, has 3 distal forewing first vein setae and distinct transverse striations on the pronotum. Both species, however, show a tendency for the ovipositor to extend beyond the tip of the abdomen. A specimen from North Queensland has been examined which has slightly broader metanotal sculpture, more distinctly lobed comb and terminal body setae slightly shorter.

BIOLOGY. Unknown.

DISTRIBUTION. South Australia, Queensland, New Guinea, Samoa, Philippines.

MATERIAL EXAMINED. SAMOA: Holotype ♀ (BPBM), AUSTRALIA: N. Queensland, 1 ♀ (BMNH).

Thrips longiceps (Bagnall)

Physothrips longiceps Bagnall, 1916a: 220–221, Lectotype ♀, INDIA (BMNH) [designated by Mound, 1968: 58] [examined].

Thrips longiceps (Bagnall): Bhatti, 1970: 380.

DESCRIPTION. Redescribed by Bhatti (1980: 144–147).

COMMENTS. Medium to large dark brown species morphologically most similar to *tristis* and *simplex*. The position of the ocellar setae varies within the type series but it is distinctive in having postocular seta II situated behind I and III. The males have particularly long b1 and b2 setae on tergite IX and an unusually small, circular to oval glandular area on each of sternites III–VII.

BIOLOGY. Collected from *Rhododendron* flowers at about 3500 m altitude.

DISTRIBUTION. Known only from the type series from N. India.

MATERIAL EXAMINED. INDIA: Lectotype ♀; 2 ♀, 3 ♂ paralectotypes (BMNH).

Thrips melastomae Priesner

(Figs 117, 137, 146)

Thrips melastomae Priesner, 1934: 262–264. Syn-type ♀, JAVA (SMF) [labelled lectotype by Bhatti, 1978] [examined].

♀ Small to medium; uniformly brown, legs pale, wings dusky, antennal segments III, base IV & V and sometimes also VI pale.

Antennae 7-segmented; ocellar setae situated

outside ocellar triangle (Fig. 117). Pronotal posteroangular setae short (Fig. 117). Metanotal campaniform sensilla present; sculpture striate; median setae situated at anterior margin (Fig. 137). Forewing first vein with 7 basal and 3 distal setae; scale with 5 setae, apical seta longer than subapical. Abdominal sternites III–VII with 12–14 discal setae; 3–4 on sternite II. Pleurotergites without discal setae. Tergite II with 3 lateral marginal setae, 4 displaced onto pleurite; tergite VIII posteromarginal comb complete, microtrichia sometimes irregular (Fig. 146).

♂ Small, pale, yellow brown, similar to ♀. Sternites III to VII each with a narrow, transverse glandular area; tergite VIII posteromarginal comb absent or indistinct; tergite IX b1 setae slightly longer than b2, bases equidistant.

COMMENTS. This species is closely related to the *hawaiiensis* group but differs in having bicoloured antennal segments IV & V and very short pronotal posteroangulars. It is also similar to *wedeliae* which has the same colouring but more numerous wing setae. More particularly it is similar to a sample of specimens, possibly of *wedeliae*, from Guam, which has more numerous sternal discal setae.

BIOLOGY. A number of specimens recently acquired from Malaysia and some from the Philippines in the USNM indicate that *melastomae* is one of the more common species in the region but possibly restricted to *Melastoma* species. Some of the type material, however, was collected from *Rhodomyrtus*.

DISTRIBUTION. Philippine Islands, Java, Sumatra, Riouw Archipelago, Malaya, Thailand.

MATERIAL EXAMINED. JAVA: Lectotype ♀, 1 ♂ paralectotype (SMF). MALAYA: 11 ♀, 1 ♂ (BMNH), 1 ♀ (USNM). PHILIPPINES: 17 ♀, 2 ♂ (USNM).

Thrips n.sp. Reyes

Thrips n.sp. Reyes, in press. Holotype ♀, PHILIPPINES (Reyes) [examined].

♀ Small; uniformly brown, legs, forewings and antennae all dark.

Antennae 7-segmented; ocellar setae situated outside ocellar triangle; postocular setae I & III well developed, II small. Metanotal campaniform sensilla absent; sculpture elongate, reticulate medially with internal wrinkles; median setae situated far behind anterior margin. Forewing first vein with 7 basal and 4 distal setae; scale with 5 setae, apical seta longer than subapical.

Abdominal sternites III–VII with 10–14 discal setae, none on sternite II. Pleurotergites without discal setae. Tergite II with 4 lateral setae, 4th may be displaced onto pleurite; tergite VIII posteromarginal comb with only a few very short, irregular microtrichia laterally.

♂ Unknown.

COMMENTS. This is not a particularly distinctive species but close relatives are difficult to recognise. In many characteristics it is similar to *leeweni* from Malaya, but, although it does not have a complete comb on tergite VIII, it is probably more closely related to *griseus* from Japan.

BIOLOGY. Described from flowers of an unknown plant.

DISTRIBUTION. Philippines.

MATERIAL EXAMINED. PHILIPPINES: Holotype ♀, 1 ♀ paratype (Reyes).

Thrips pavettae (Priesner)

(Figs 127, 138, 147)

Taeniothrips pavettae Priesner, 1938: 493–494.

Holotype ♀, SUMATRA (SMF) [examined].
Thrips pavettae (Priesner): Bhatti, 1978: 191.

♀ Medium to large; uniformly brown, legs brown, wings dark, antennal segment III paler.

Antennae 8-segmented; ocellar setae III situated outside ocellar triangle (Fig. 127). Metanotal campaniform sensilla present; sculpture striate; median setae situated at anterior margin and close together (Fig. 138). Forewing first vein with 7–8 basal and 2–3 distal setae; scale with 5–7 setae, apical setae smaller than subapical. Abdominal sternites III–VII with about 10 discal setae, 2 on sternite II. Pleurotergites without discal setae. Tergite II with 3 lateral marginal setae; tergite VIII posteromarginal comb complete but microtrichia often irregular (Fig. 147).

♂ Brown, similar to ♀; sternites III–VII each with a large, transverse glandular area; tergite VIII posteromarginal comb probably absent; tergite IX b1 seta much longer and stouter than b2 and slightly closer to b2 than to each other.

COMMENTS. This species is closely related to *brevistylus* from Java and differs only in having the median metanotal setae a little further apart and less distinct pronotal striations.

BIOLOGY. Unknown.

DISTRIBUTION. Sumatra, Java.

MATERIAL EXAMINED. SUMATRA: Holotype ♀, 1 ♀ paratype (SMF). JAVA: 1 ♂ (BMNH).

Thrips samoensis (Moulton)

Taeniothrips samoensis Moulton, 1944: 268–270. Holotype ♀, SAMOA (CAS) [not examined].

Thrips samoensis (Moulton): Bhatti, 1978: 191.

♀ Small to medium; uniformly midbrown, legs pale, wings dark with base paler, antennal segment III pale.

Antennae 8-segmented; ocellar setae III situated outside ocellar triangle. Metanotal campaniform sensilla present; sculpture striate; median setae situated at anterior margin. Forewing first vein with an almost complete row of setae, 4+9 basal and 2 distal setae; scale with 5 setae, apical longer than subapical. Abdominal sternite II with discal setae; sternites III–VII with 8–16 discal setae, 1–2 on sternite II. Pleurotergites without discal setae. Tergite II with 4 lateral setae; tergite VIII posteromarginal comb complete but microtrichia short and sometimes irregular.

♂ Unknown, although 1 ♂ in BMNH, from *Passiflora* flowers in W. Samoa, has been examined which may be this species. It has been poorly preserved but mentioned here because until now the only species in the group whose males are known is *sumatrensis*.

Small, pale brown; antennae 8-segmented; forewing first vein with 4+6 basal setae and 3 distal; sternites III–VII each with a large transverse glandular area; tergite VIII posteromarginal comb indistinct; tergite IX b1 setae longer than b2 and slightly closer to b2 than to each other.

COMMENTS. This species belongs to a closely related species group which includes *cinchonae*, *wedeliae* and *sumatrensis*. It is most similar in colour and numbers of sternal discal setae to *sumatrensis* which is larger and has 7-segmented antennae with longer segments. *T. cinchonae* is darker and has a finer, more regular comb and 7-segmented antennae; *wedeliae*, although it sometimes has 8-segmented antennae with short segments, has bicoloured segments IV & V. *T. fulmeki* is also similar in colour and has 8-segmented antennae but it is much larger, has a complete row of first vein setae and more closely striate metanotal sculpture. *T. novocaledonensis* is also difficult to distinguish, with similar colour and 8-segmented antennae, particularly in samples from the New Hebrides. It may be recognised, however, by the usual presence of at least 1 pleurotergal discal seta.

BIOLOGY. Possibly associated particularly with

Compositae although BMNH specimens from New Hebrides are from citrus and legume flowers.

DISTRIBUTION. Samoa, New Hebrides.

MATERIAL EXAMINED. SAMOA: 8 ♀ paratypes (CAS). NEW HEBRIDES: 14 ♀ (BMNH).

DOUBTFULLY ASSOCIATED MATERIAL.

SAMOA: 1 ♂ (BMNH).

Thrips simplex (Morison)

(Figs 122, 139, 151)

Physothrips simplex Morison, 1930: 12–13. Holotype ♀, SOUTH AUSTRALIA (BMNH) [examined].

Thrips simplex (Morison): Bhatti, 1969b: 380.

♀ Medium to large; uniformly dark, legs dark, antennae dark, segment III pale, wings pale to dusky with base slightly paler.

Antennae 8-segmented; ocellar setae III situated inside ocellar triangle (Fig. 122). Metanotal campaniform sensilla absent; sculpture of ill-formed but distinct reticulations with internal wrinkles; median setae situated far behind anterior margin (Fig. 139). Forewing first vein with 7 basal and 4–7 distal setae; scale with 5 setae, apical longer than subapical. Abdominal sternites III–VII with 12–16 discal setae, 1–2 on sternite II. Tergite II with 3 lateral setae; tergite VIII posteromarginal comb complete, microtrichia long but slightly irregular.

♂ Brown, similar to ♀; sternites III–VII each with a large glandular area (Fig. 151); tergite VIII posteromarginal comb of very short, sparse and irregular microtrichia, tergite IX b1 setae anterior to b2, more or less equal in length and distance between bases.

COMMENTS. The only other species in this group that have distinctly reticulate metanotal sculpture are *leeuweni* from Singapore, which has the median metanotal setae situated at the anterior margin, *longicaudatus* from Samoa, which has a complete row of forewing first vein setae, ocellar setae III situated outside the ocellar triangle and median metanotal setae situated at the anterior margin, and *unispinus* from New Guinea, which is a yellow species, has 7-segmented antennae, only 1 pair of pronotal posteroangulars and additional sternal posteromarginal setae. *T. leeuweni* and *unispinus* have only 3 distal forewing first vein setae and all three have metanotal campaniform sensilla. There are a number of African species, however, that are probably more closely related to *simplex* than any of these.

Specimens very similar to *simplex* have been examined; 1 ♀, 1 ♂ from Java and 1 ♀, 1 ♂ from Malaya. They are smaller and paler than typical *simplex*, they have only 3 distal forewing first vein setae and more elongate metanotal reticulations. The males also differ in being pale, with smaller oval sternal glandular areas and tergite IX b1 setae more or less equal in length to b2 but slightly closer to b2 than to each other.

BIOLOGY. Common in *Gladiolus* flowers and often causes serious economic damage (Hargreaves & Cooper, 1980).

DISTRIBUTION. Hong Kong, Philippines, New Guinea, Australia, New Zealand, Hawaii, India. Also Europe, Africa and the Americas.

MATERIAL EXAMINED. AUSTRALIA: S.A., Holotype ♀, 1 ♀ paratype, also about 100 ♀, ♂ from Hong Kong, New Guinea, Australia, New Zealand, India, Europe, Africa, the Americas (BMNH).

DOUBTFULLY ASSOCIATED MATERIAL. JAVA: 1 ♀, 1 ♂. Malaya: 1 ♀, 1 ♂ (BMNH).

Thrips sumatrensis Priesner

(Figs 124, 140, 148, 150)

Thrips (Isoneurothrips) sumatrensis Priesner, 1934: 254–256. Holotype ♀, JAVA (SMF) [not examined].

Thrips leucaenae Moulton, 1942: 9. Holotype ♀, GUAM (CAS) [synonymised by Bhatti, 1980: 112] [examined].

♀ Medium; uniformly brown, wings dark with base paler, antennal segment III pale, IV & V sometimes pale at extreme base.

Antennae 7-segmented; ocellar setae situated outside ocellar triangle (Fig. 124). Metanotal campaniform sensilla present; sculpture striate; median setae at anterior margin (Fig. 140). Forewing first vein with numerous setae (4+4–8+2–3); scale with 5 setae apical seta longer than subapical. Abdominal sternites III–VII with 9–16 discal setae, 2–3 on sternite II. Pleurotergites without discal setae. Tergite II with 3 lateral setae; tergite VIII posteromarginal comb complete but microtrichia short and irregular (Fig. 148).

♂ Small, yellow; sternites III–VII each with a narrow transverse glandular area (Fig. 150); tergite VIII posteromarginal comb complete but microtrichia very short and indistinct; tergite IX b1 setae longer than b2 and slightly closer to b2 than to each other.

COMMENTS. This species is closely related to *cinchonae* which is darker with a longer, more regular comb; *samoensis* with 8-segmented antennae and shorter antennal segments; *wedelliae* with short, bicoloured antennal segments.

Samples from Guam, including the type series of *leucaenae*, tend to have an orange-brown thorax and darker abdomen. The males are paler with narrow, transverse glandular areas on sternites III–VII. A sample of 16 ♀, 4 ♂ from wild legumes in Thailand (SO) and 4 ♀, 1 ♂ from *Erythrina variegata* in Thailand have also been examined and assigned to this species although most specimens have bicoloured antennal segments. This variation is discussed under *wedelliae*.

BIOLOGY. Apparently common in flowers of many species, described from *Cahlia*, *Canna*, *Jasminum* and *Mangifera*, specimens have also been examined from composites, and wild legumes, beans, *Ipomea* and *Plumeria*.

DISTRIBUTION. Sumatra, Java, Timor, Guam, Philippines, Tahiti, Thailand.

MATERIAL EXAMINED. JAVA: Holotype ♀; 6 ♀, 2 ♂ paratypes of *sumatrensis* (SMF). TAHITI: 9 ♀, 3 ♂ (USNM). GUAM: Holotype ♀, 4 ♀ paratypes of *leucaenae* (CAS), 17 ♀, 2 ♂ (USNM).

DOUBTFULLY ASSOCIATED MATERIAL. THAILAND: 16 ♀, 14 ♂ (SO); 4 ♀, 1 ♂ (BMNH).

Thrips tristis (Priesner)

(Figs 125, 141)

Taeniothrips tristis Priesner, 1938: 494–496.

Holotype ♀, JAVA (SMF) [examined].

Thrips tristis (Priesner): Bhatti, 1978: 191.

♀ Large; uniformly dark brown, legs brown, wings dark with base slightly paler, antennae dark, III not much paler than the rest.

Antennae 8-segmented; ocellar setae III situated outside ocellar triangle (Fig. 125). Metanotal campaniform sensilla present; sculpture striate; median setae situated at or near anterior margin (Fig. 141). Forewing first vein with 7 basal and 3 distal setae; scale with 5 setae, apical shorter than subapical. Abdominal sternites III–VII with about 8 discal setae, 2–3 on sternite II. Pleurotergites without discal setae. Tergite II with 4 lateral marginal setae; tergite VIII posteromarginal comb complete, microtrichia long and regular.

♂ Smaller and paler than ♀, orange-brown; sternites III–VII each with a transversely oval

glandular area; tergite VIII posteromarginal comb indistinct or absent; tergite IX b1 setae twice as long as b2 and slightly closer to b2 than to each other.

COMMENTS. This species is most closely related and similar to *brevistylis* from Java and *pavettae* from Sumatra, but these have darker wings, paler antennal segment III and median metanotal setae very close together. It is also similar in appearance to *kotoshoi* from Taiwan and Fiji and the common and more widespread *vitticornis* but these have dark wings, pale antennal segment III and tergite VIII posteromarginal comb absent medially.

BIOLOGY. Unknown.

DISTRIBUTION. Java.

MATERIAL EXAMINED. JAVA: Holotype ♀, 1 ♂ paratype (SMF).

Thrips unispinus Moulton

(Figs 129, 131)

Thrips (Epithrips) unispinus Moulton, 1940: 252.

Holotype ♀, NEW GUINEA (BPBM) [not examined].

♀ Small; pale yellow, legs pale, wings pale, antennal segments I–base III pale.

Antennae 7-segmented; ocellar setae III situated inside ocellar triangle (Fig. 129). Pronotum with only inner posteroangular setae well developed (Fig. 129). Metanotal campaniform sensilla present; sculpture reticulate; median setae situated far behind anterior margin (Fig. 131). Forewing first vein with 7 basal and 3 distal setae; scale with 5 setae, apical longer than subapical. Abdominal sternites III–VII with 16–20 long discal setae and 4–5 pairs posteromarginal setae; sternite II with 1 or 2 discals. Pleurotergites without discal setae. Tergite II with 4 lateral setae; tergite VIII posteromarginal comb absent medially.

♂ Similar to ♀; sternites III–VII each with a small transverse glandular area; tergite VIII posteromarginal comb complete, short, craspedum-like, without microtrichia; tergite IX b1 setae slightly longer than b2 and slightly closer to b2 than to each other.

COMMENTS. Although this species appears to be most similar to *subnudula* and *imaginis*, both of them pale yellow species with numerous sternal discal setae, it differs in having no pleurotergal discal setae and only the inner pronotal posteroangular setae well developed. As discussed in the

introduction to groups, Table 3 and under *subnudula* and *imarginis*, however, 2 ♀ (SO) of an undescribed species have been examined, which have no long pronotal posteroangular setae, and 9 ♀, 5 ♂ (BMNH) from New Guinea of another undescribed species have the outer posteroangular setae only a little shorter than the inner pair and the pronotal discal setae are finer and sparser than those of *subnudula*. The stability of these characteristics is therefore put into question and species relationships difficult to assess.

BIOLOGY. Unknown.

DISTRIBUTION. New Guinea, Solomon Islands, Brunei, Australia (Queensland).

MATERIAL EXAMINED. NEW GUINEA: 1 ♀, 3 ♂ paratypes (CAS), 2 ♀ (BMNH). SOLOMON IS: 1 ♀, 1 ♂ (BMNH). BRUNEI: 1 ♂ (BMNH). AUSTRALIA, Queensland: 1 ♂ (BMNH)

Thrips unonae Priesner

(Figs 126, 142, 149)

Thrips unonae Priesner, 1934: 260–261. Lectotype ♀, JAVA (SMF) [designated by Bhatti, 1978] [examined].

♀ Small to medium; uniformly brown species, wings dusky with base slightly paler, antennal segment III pale.

Antennae 7-segmented; ocellar setae III situated outside ocellar triangle (Fig. 126). Metanotal campaniform sensilla present; sculpture broadly striate with a few ill-formed reticulations medially; median setae situated at anterior margin (Fig. 142). Forewing first vein with 7 basal and 3 distal setae; scale with 5 setae, apical longer than subapical. Abdominal sternites III–VII with 12–18 discal setae; sternite II with 2–3. Pleurotergites without discal setae. Tergite II with 4 lateral marginal setae; tergite VIII posteromarginal comb complete but microtrichia sometimes short and irregular (Fig. 149).

♂ Unknown.

COMMENTS. This species belongs to the *hawaiiensis* species group and is particularly difficult to distinguish from brown *hawaiiensis*. The metanotal sculpture is slightly broader and the comb is possibly a little better developed than most *hawaiiensis*. It is retained as a distinct species as the taxonomy of the group is particularly complex and it should be included in a more detailed examination, possibly a morphometric analysis (Nakahara, 1985; Palmer & Wetton, 1987).

BIOLOGY. Unknown.

DISTRIBUTION. Java.

MATERIAL EXAMINED. JAVA: Lectotype ♀ (SMF).

Thrips vitticornis Karny

(Fig. 128)

Thrips vitticornis Karny, 1922: 103–106. Lectotype ♀, THAILAND (SMF) [designated by Bhatti, 1980: 161] [not examined].

Taeniothrips canavaliae Moulton, 1928c: 295–297. Holotype ♀, GUAM (CAS) [synonymised by Priesner, 1938: 524] [not examined].

Thrips vitticornis (Karny): Bhatti, 1969b: 380.

♀ Medium; uniformly mid-brown, legs dark, wings dark or with base slightly paler, antennal segment III pale.

Antennae 8-segmented; ocellar setae situated outside ocellar triangle; postocular setae all small (Fig. 128). Metanotal campaniform sensilla present; sculpture closely striate; median setae situated at anterior margin (cf. Fig. 134). Forewing first vein with 7 basal and 3–8 distal setae; scale with 5 setae, apical longer than subapical. Abdominal sternites III–VII with 10–14 discal setae; sternite II with 1–2. Pleurotergites without discal setae. Tergite II with 4 lateral setae, the 4th sometimes displaced onto the pleurite; tergite VIII posteromarginal comb absent medially.

♂ Brown, similar to ♀; sternites III–VII each with a very broad sternal glandular area; tergite VIII posteromarginal comb absent; tergite IX b1 & b2 setae situated behind campaniform sensilla, b1 more or less equal in length to b2 and closer to b2 than to each other.

COMMENTS. This species is unusual in the group in having all postocular setae small. It is most closely related and similar to *kotoshoi* from Taiwan but this species is larger, has only 3 distal forewing first vein setae and longer postoculars I & II.

BIOLOGY. This is one of the more common and widespread species in the Oriental and Pacific Regions and appears to be attracted to legume flowers.

DISTRIBUTION. New Hebrides, Solomon Is, Tonga, Samoa, Tambaram, Torres Strait, Fiji, Krakatau, Verlaten, Thailand, Vietnam, Taiwan, Malaya, Java, Sumatra, Philippines, Botel Tobago, Palau I., Guam, Hawaii, India, Marshall Is.

MATERIAL EXAMINED. GUAM: 9 ♀ and 7 ♀

determined by Moulton as *canavaliae*. FIJI: 2 ♀. NEW HEBRIDES: 20 ♀, 4 ♂. SUMATRA: 2 ♀. MALAYA: 1 ♀, 2 ♂. SOLOMON IS: 7 ♀, 3 ♂. TORRES STRAIT: 3 ♀, 1 ♂. TAM-BARAM: 1 ♀, 1 ♂. THAILAND: 2 ♀. INDIA: 1 ♀, 1 ♂. (All in BMNH).

DOUBTFULLY ASSOCIATED MATERIAL.

TONGA: 1 ♂ (BMNH).

Thrips wedeliae Priesner stat.n.

Isoneurothrips setipennis Moulton, 1928b: 297–298. Holotype ♀, TAIWAN (CAS) [secondary homonym of *setipennis* Bagnall] [examined].

Thrips (Isoneurothrips) sumatrensis var *wedeliae* Priesner, 1934: 257. Syntypes ♀ SEBESI (SMF) [synonymised by Sakimura, 1967b: 434] [not examined].

Thrips setipennis (Moulton): Sakimura, 1967b: 434.

♀ Small to medium; uniformly dark brown, wings dark with base slightly paler, tibiae pale, antennal segments II & III pale, IV–VI bicoloured.

Antennae 7- or 8-segmented; ocellar setae III situated outside ocellar triangle. Metanotal campaniform sensilla present; sculpture striate; median setae situated at anterior margin. Forewing first vein with an almost complete row of setae, 8 basal, 5 medially and 2 distal; scale with 5 setae apical seta more or less equal to subapical or slightly longer. Abdominal sternites III–VII with 5–16 discal setae, 1–2 on sternite II. Pleurotergites without discal setae. Tergite II with 3 lateral setae, (majority of specimens in BMNH have 4); tergite VIII posteromarginal comb complete but irregular.

♂ Unknown.

COMMENTS. Bhatti (1978: 191), in transferring the Australian species *setipennis* Bagnall to *Thrips*, created a senior secondary homonym with *setipennis* Moulton. Therefore *wedeliae* Priesner has become the valid name.

This species belongs to the closely related species group of *cinchonae*, *samoensis* and *sumatrensis*, but these all usually have completely brown antennal segments IV–VI. *T. sumatrensis* tends to be the most variable in antennal colour and 17 ♀, 3 ♂ from Guam belonging to the USNM are almost as pale as *wedeliae*. *T. cinchonae* also differs in having a longer, finer comb.

All species in this group are very difficult to distinguish. 9 ♀, 3 ♂ from *Alpina purpurata* and

Plumeria sp. in Tahiti (USNM) and 32 ♀ from composite flowers in the Solomon Islands (BMNH, 2 ♀ SMF) have been identified as *wedeliae* although antennal colour, comb and number of sternal discs all vary. 20 ♀ from Taiwan from the Priesner collection (SMF) are identical with the type. Although characteristics within small samples tend to be consistent, in larger samples there are always some specimens which are more similar to *sumatrensis*. Conversely a sample of 16 ♀, 4 ♂ from legumes in Thailand (SO) and 4 ♀, 1 ♂ from *Erythrina variegata* in Thailand (BMNH) have been identified as *sumatrensis* although a number of female and all male specimens have bicoloured antennal segments IV & V. This coloration does not appear to be correlated with body size. The variation is difficult to interpret and must shed doubt on the validity not only of *wedeliae* and *sumatrensis* but also of *samoensis* and *cinchonae*.

BIOLOGY. Common on compositae.

DISTRIBUTION. Taiwan, Philippines, Solomon Islands, Timor, Guam.

MATERIAL EXAMINED. TAIWAN: Holotype ♀ of *setipennis* Moulton (CAS), 2 ♀ (SMF). GUAM, 17 ♀, 3 ♂ (USNM).

DOUBTFULLY ASSOCIATED MATERIAL. TAHITI: 9 ♀, 3 ♂ (USNM). SOLOMON IS: 32 ♀ (BMNH), 20 ♀ (SMF).

PHYLOGENETIC CONSIDERATIONS

Recent studies indicate that the difficulties in determining phylogenetic relationships within Thysanoptera are primarily the result of a high degree of homoplasy in the external taxonomic characteristics (Mound, Heming & Palmer, 1980; Mound & Palmer, 1981; Gauld & Mound, 1982). In the present study an attempt was made to identify monophyletic groups of species within the genus *Thrips* by conducting a cladistic analysis of all characters used in the taxonomic study to distinguish species. The outgroup chosen for the analysis was *Adelphithrips*, the proposed sister genus of *Thrips* (Mound & Palmer, 1981). Using the bb* tree-building option of the 'Hennig 86' microcomputer phylogenetics package of J.S. Farris, separate analyses were performed with all character states ordered, all character states unordered, and with a combination of

ordered and unordered character states. A Nelson consensus tree was produced from each. The analysis using ordered character states produced some resolution for those species that remained unresolved using unordered character states, and *vice versa*. This may suggest that there has been more than one line of evolution, but this possibility has not been pursued in this study.

A number of species were consistently grouped together in all trees. Unfortunately some of these groups comprised species from more than one of the five taxonomic species groups defined in this paper. Species from group I were widespread in all trees. Some of the species from group II formed two stable groups: *rapaensis*, *rhabdotus*, *tectus*, *seticolis*, *cerno*; and *alatus*, *flavus*, *kodaicanalensis*, *nigropilosus*, *palidulus*, *palmi*, *carthami*, *fuscicornis*, *flavidulus*. The relationships of the remaining species within this group are unresolved. Group III species form a stable group with the exception of *compressicornis*, *decens* and *setipennis*. Species in groups IV and V merge badly with each other. The only stable groups are: *apicatus*, *facetus*, *subnudula*, *imiginis*, *australia* (group IV) with their closest relative *unispinus* (group V); *andrewsi*, *leeuweni*, *longicauda*, *tristis*, *brevistylus*, *pavettiae* (group V); two species pairs *obscuratus-phormiicola* and *austellus-coprosmae* (group IV).

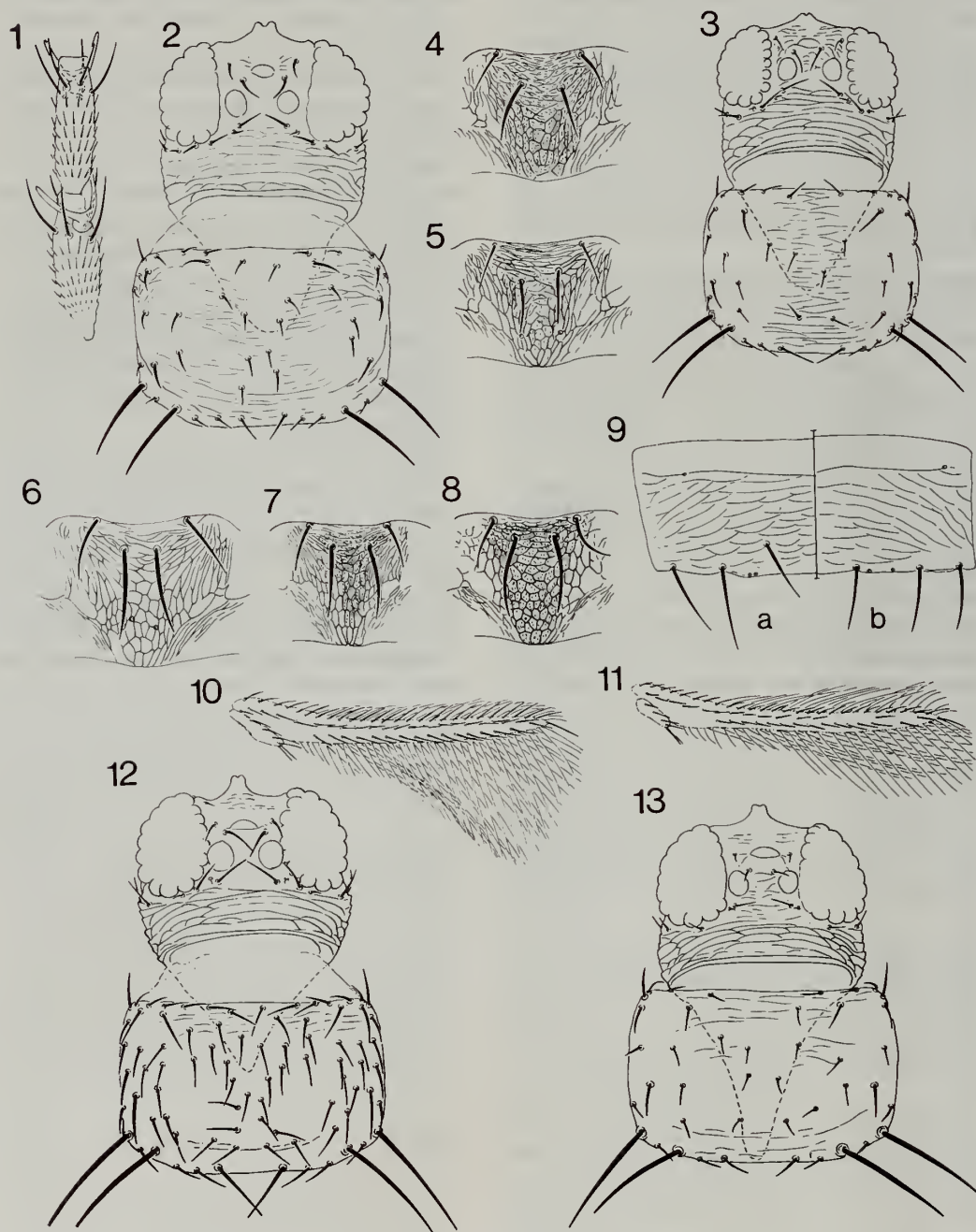
It is clear that the characters used traditionally for species recognition in *Thrips*, and more widely in Thysanoptera, are not sufficient to resolve phylogenetic relationships. More stable characteristics, perhaps of internal morphology or molecular data, remain to be recognised which will help to resolve relationships within this group.

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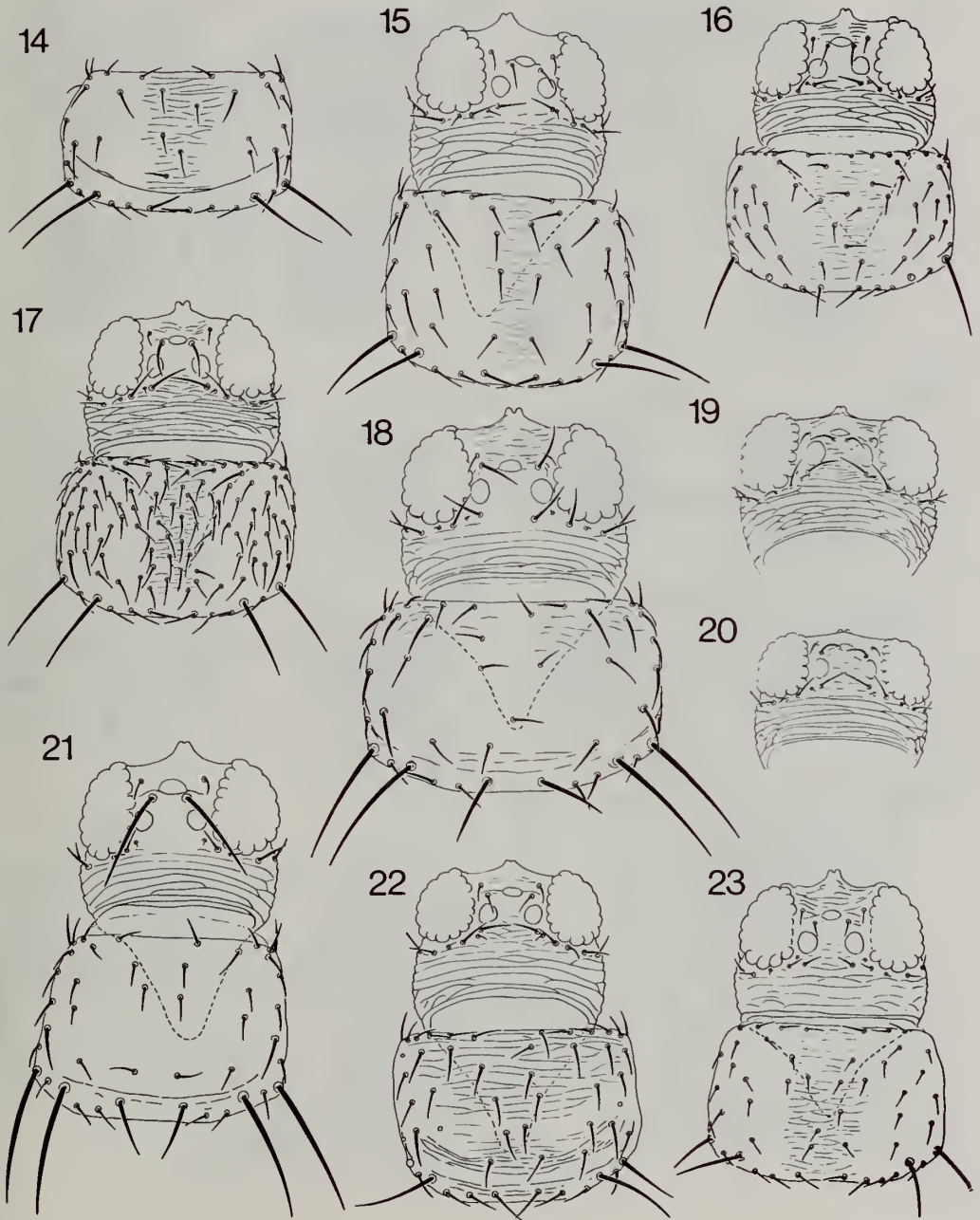
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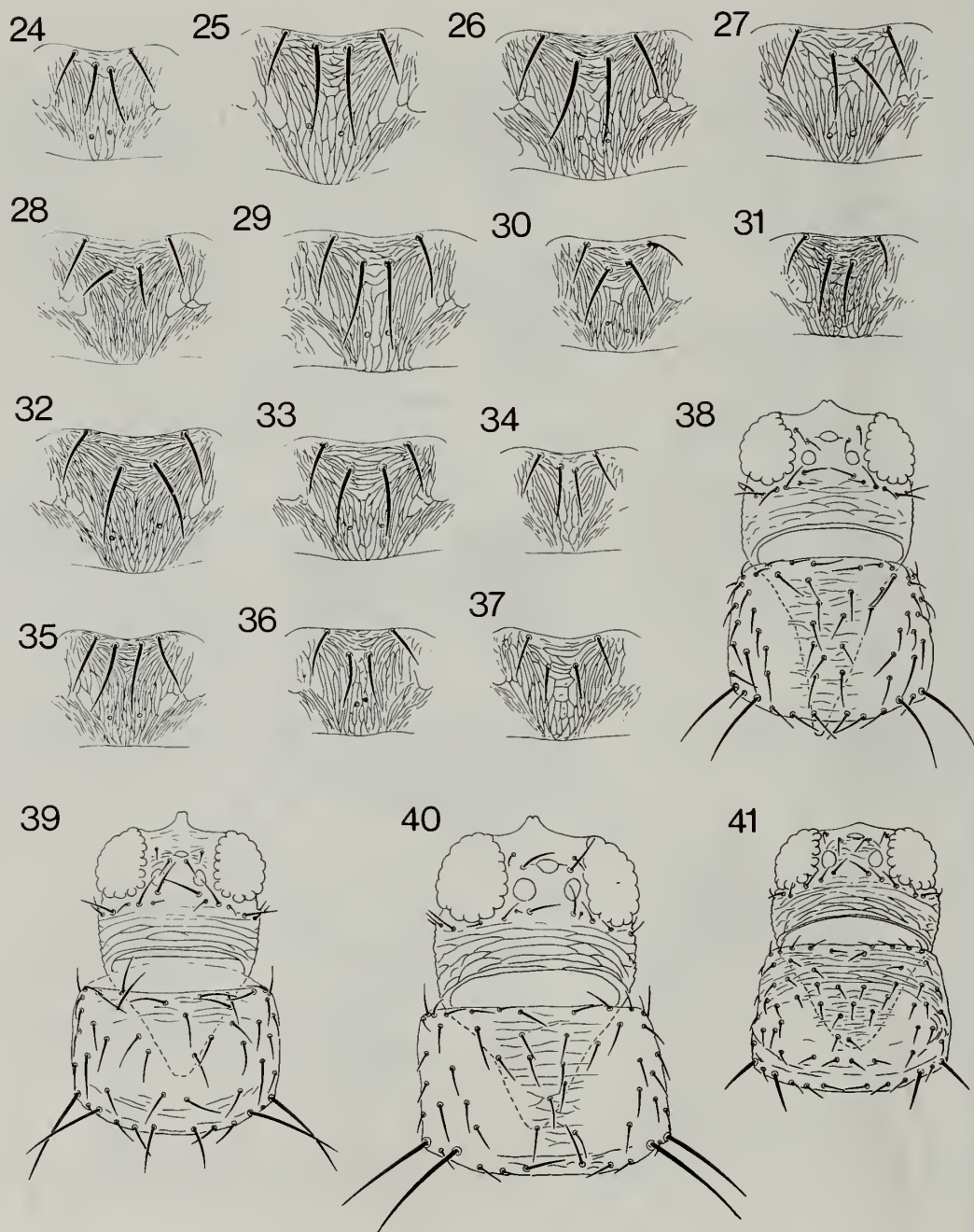
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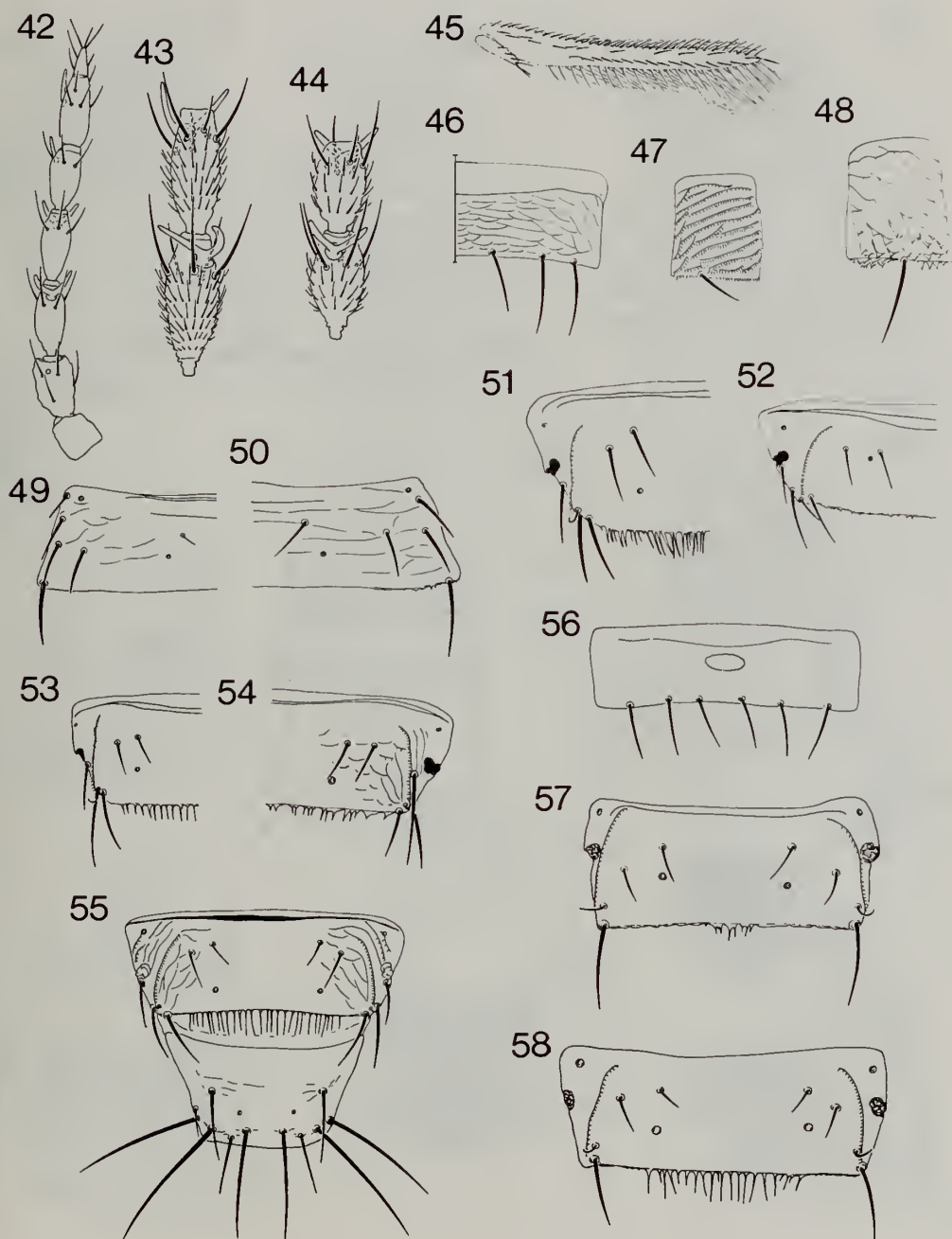
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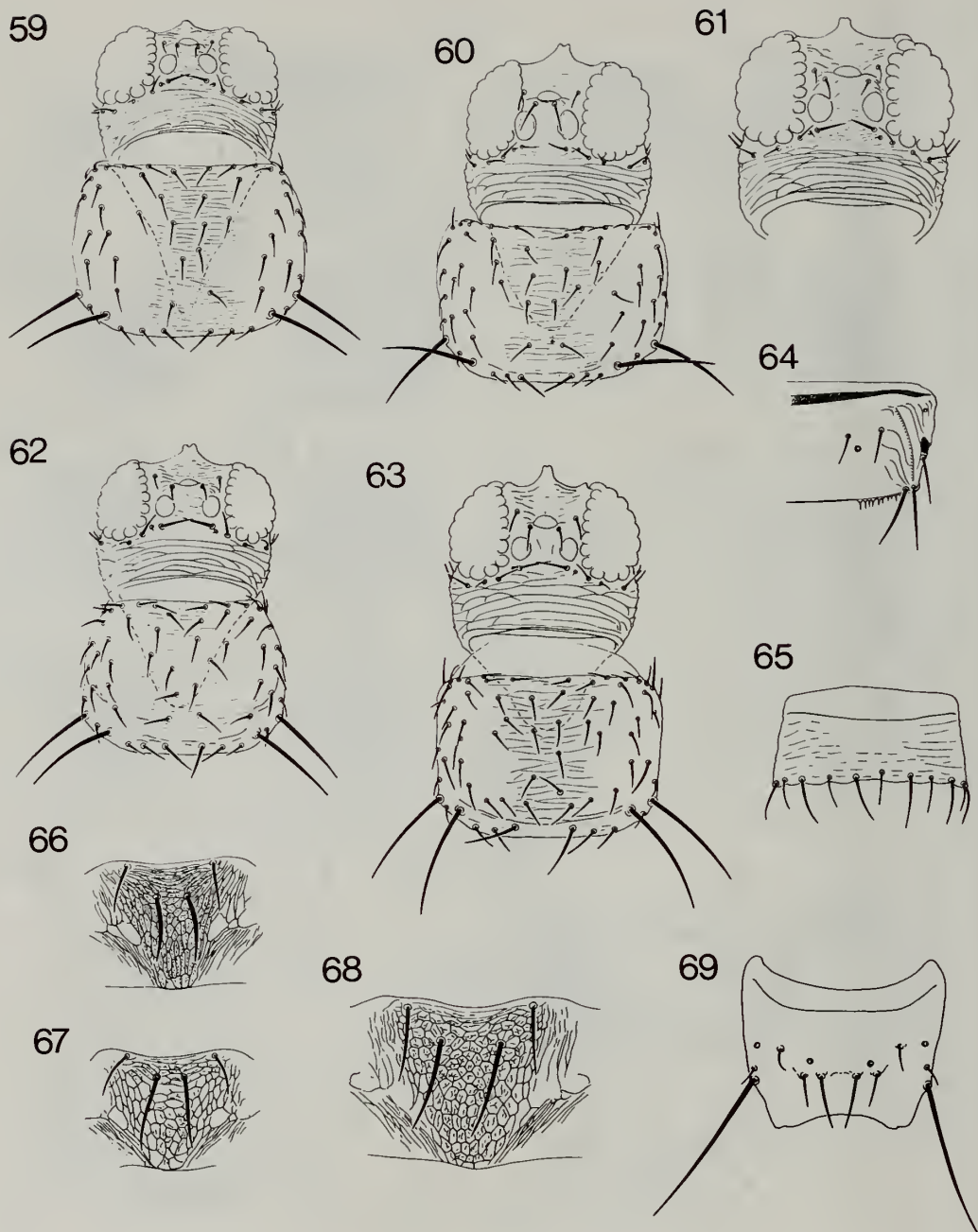
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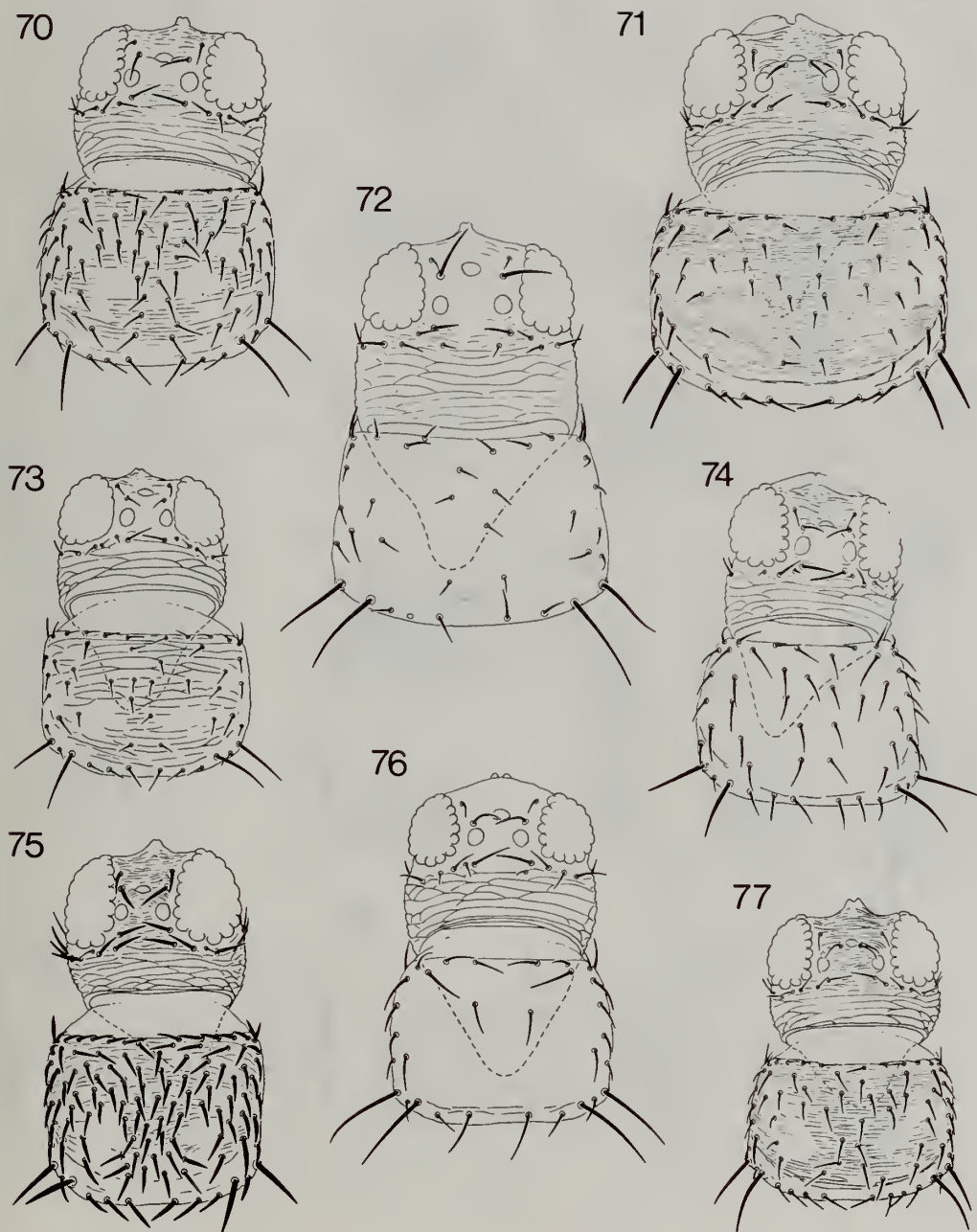
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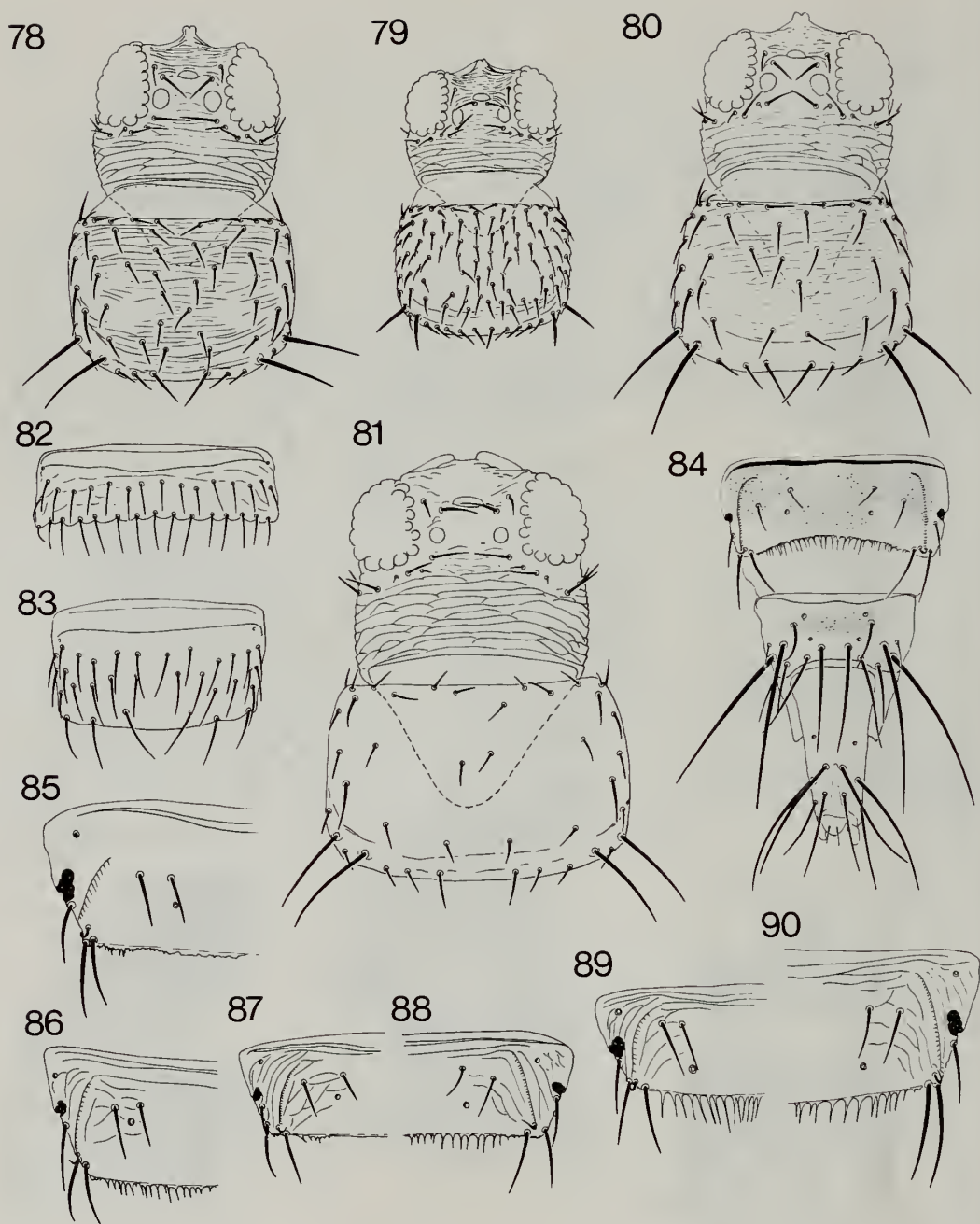
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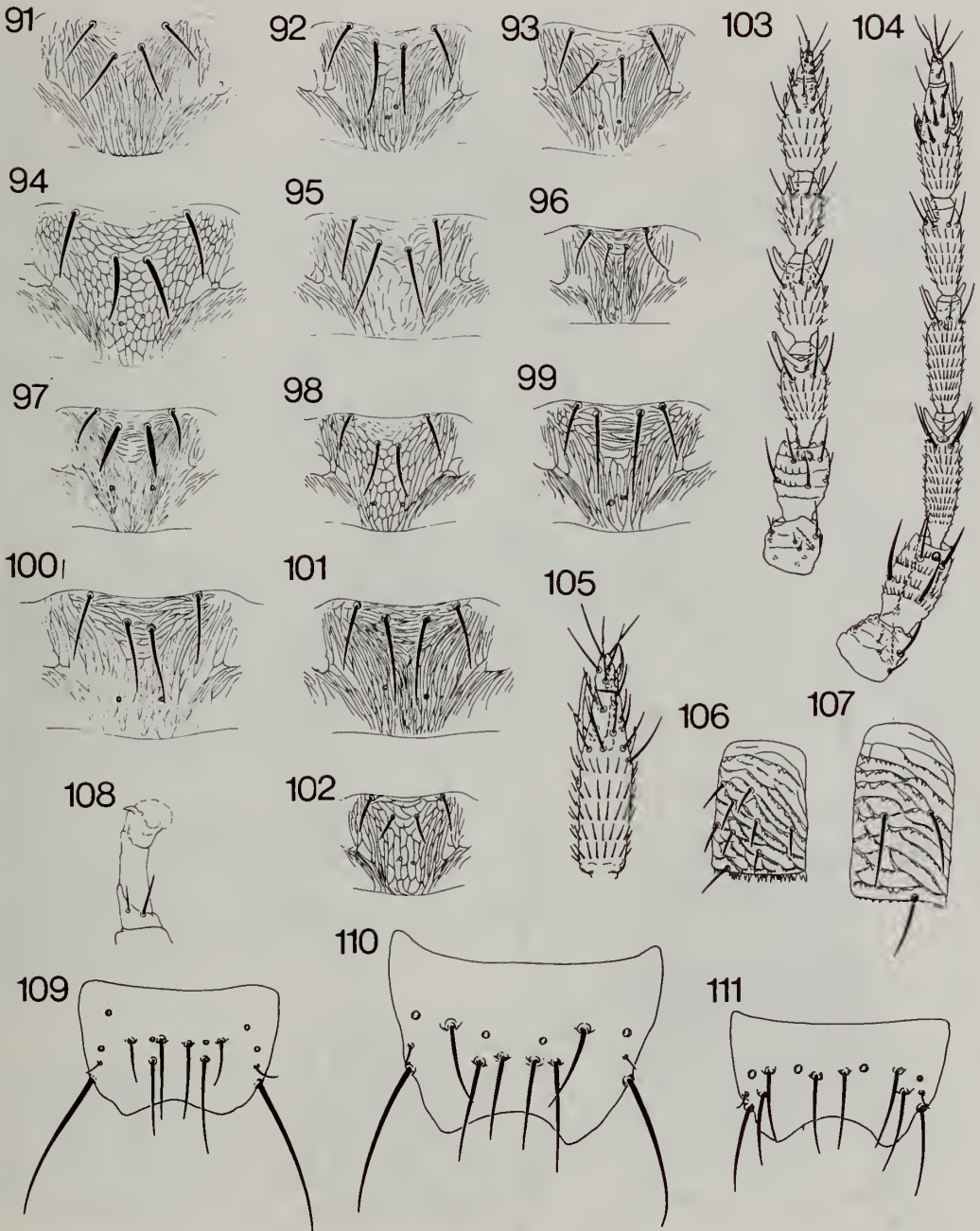
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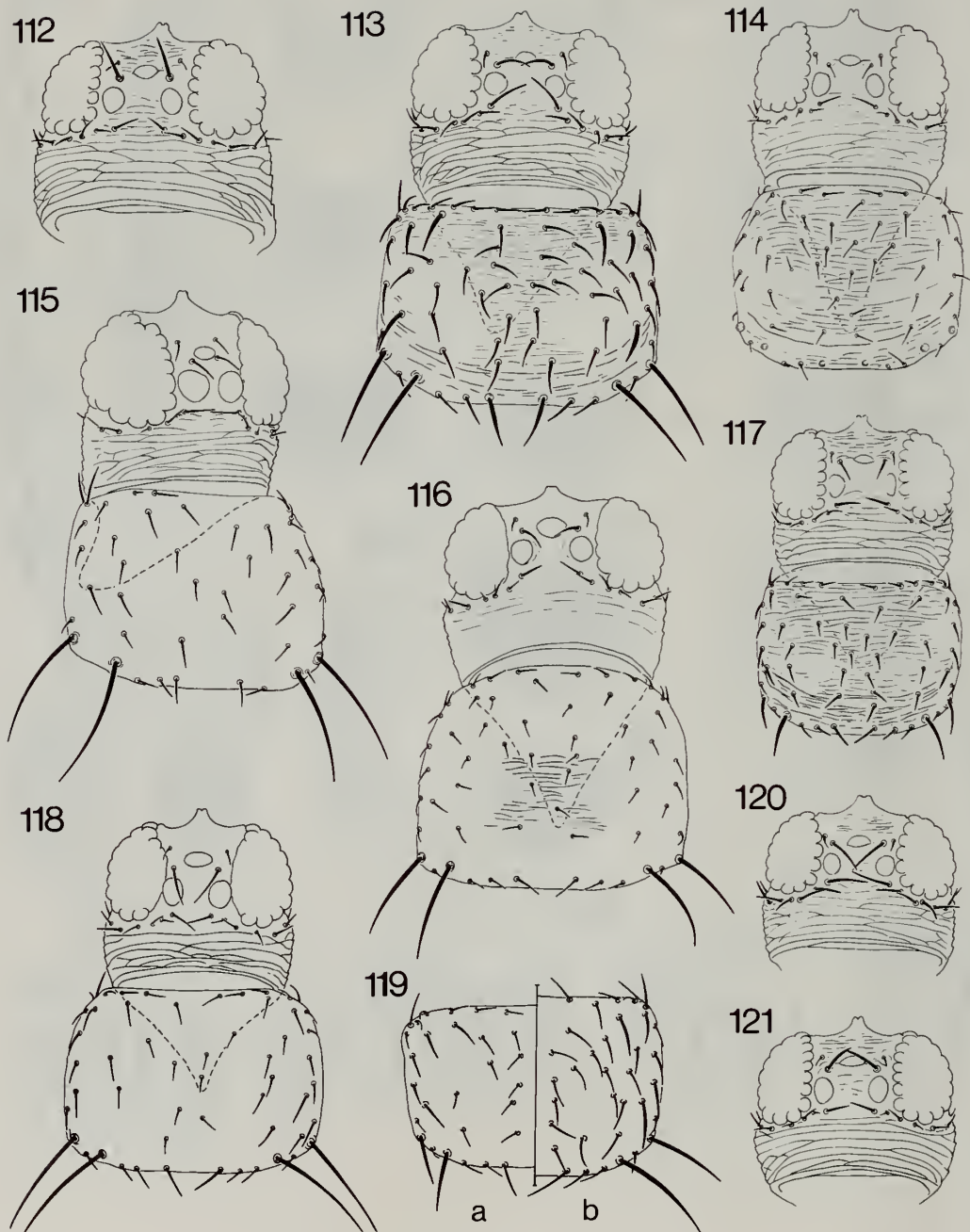
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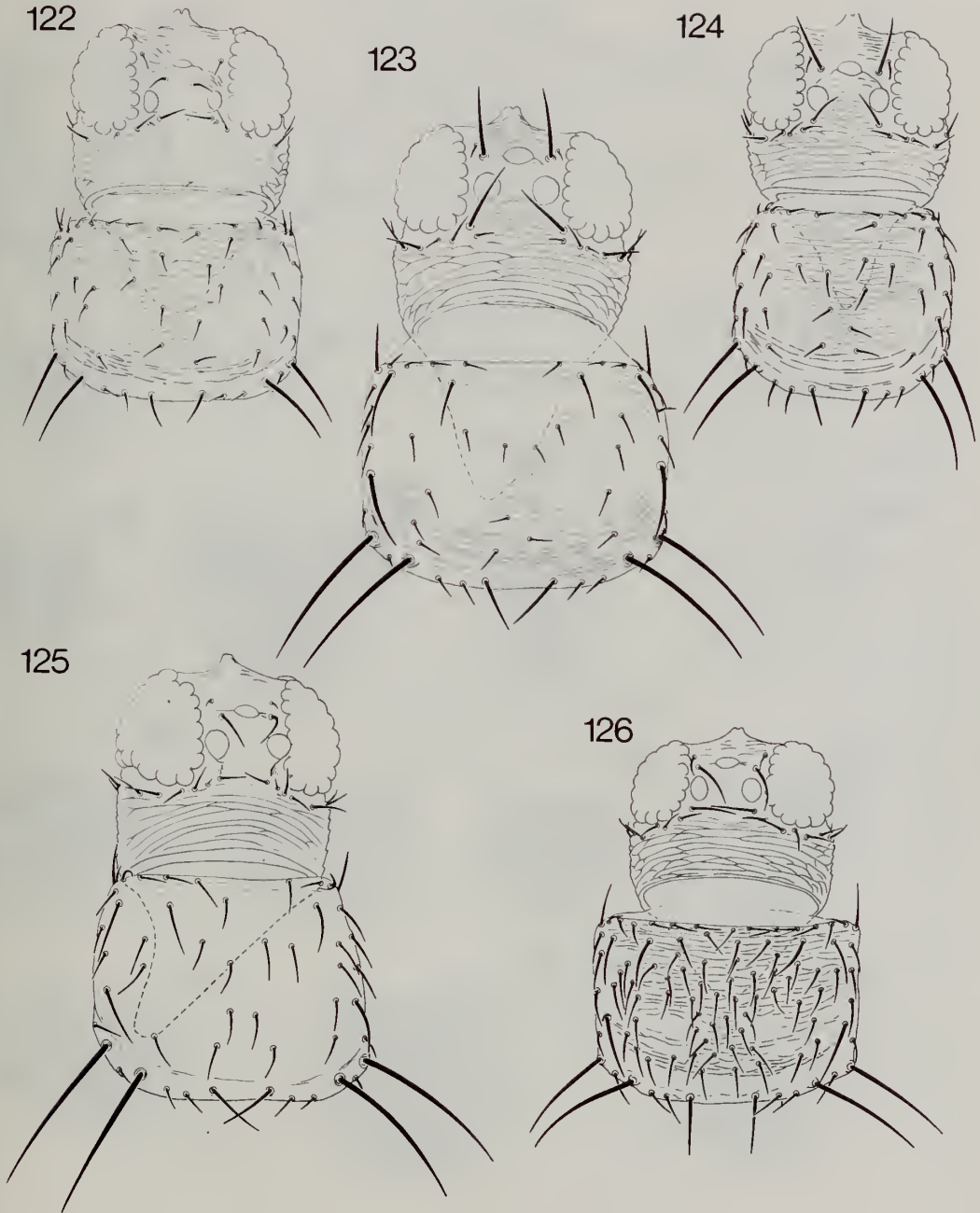
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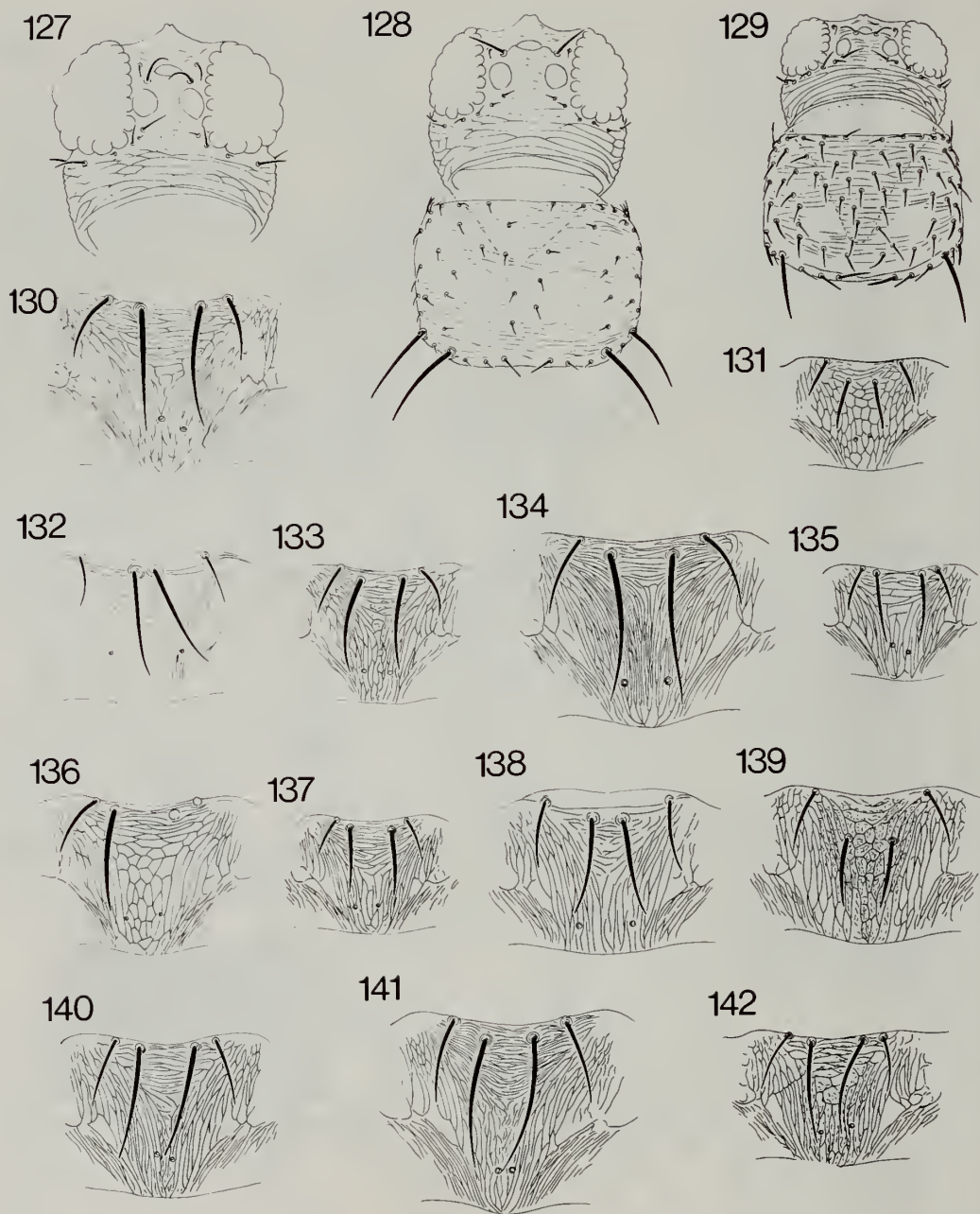
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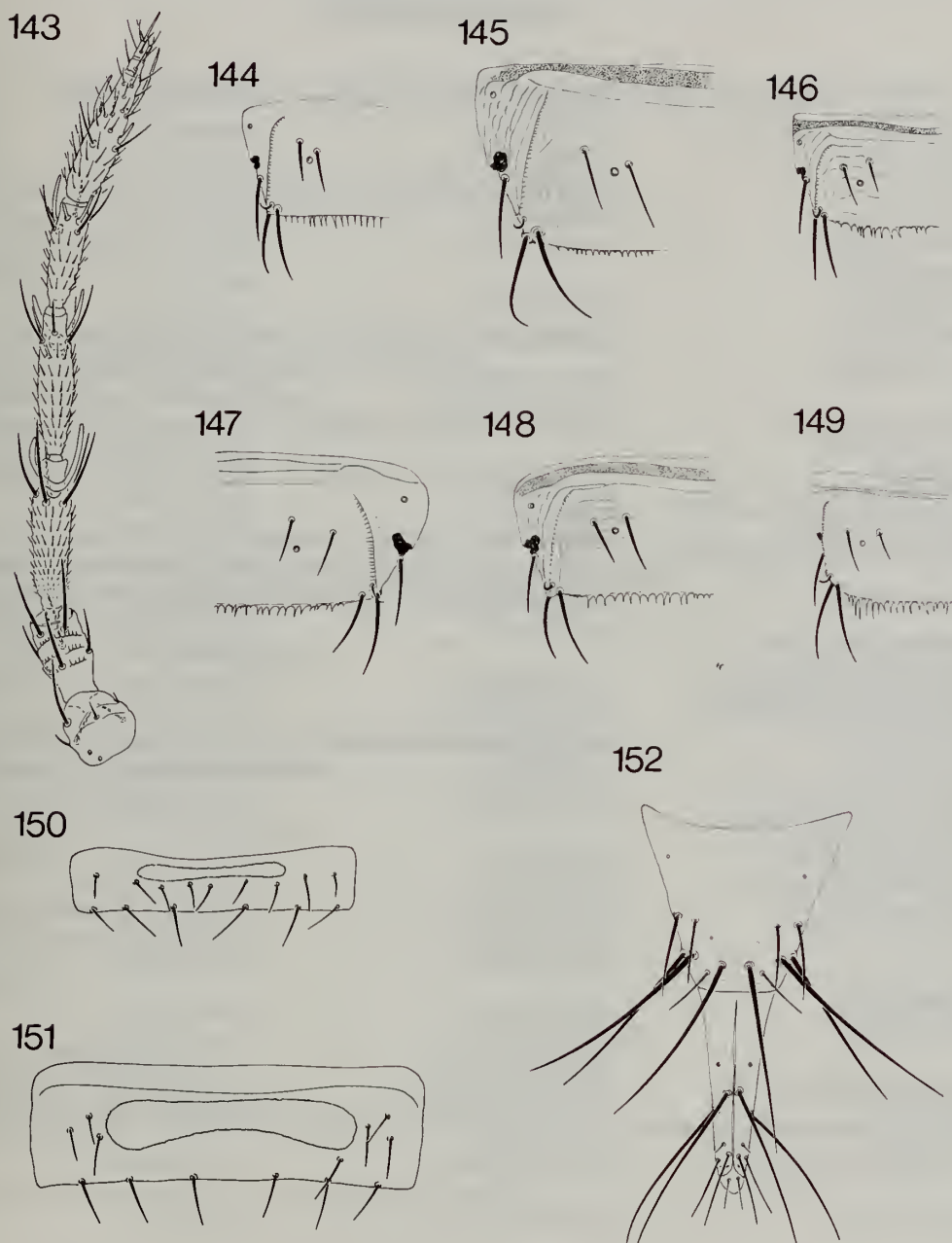
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